Final Environmental Assessment and
Draft Finding of No Significant Impact

SCHOFIELD BARRACKS IMPACT AREA PRESCRIBED BURN
Schofield Barracks Military Reservation, Oahu, Hawaii

APRIL 2003

Prepared by:

Directorate of Public Works
U.S. Army Garrison, Hawaii

Prepared for:

Headquarters, 25th Infantry Division (Light) and
U.S. Army, Hawaii

DEPARTMENT OF THE ARMY
HEADQUARTERS, 25TH INFANTRY DIVISION (LIGHT) &
U.S. ARMY, HAWAII
SCHOFIELD BARRACKS, HAWAII 96857-6000

ENVIRONMENTAL ASSESSMENT
FOR
SCHOFIELD BARRACKS IMPACT AREA
PRESCRIBED BURN
SCHOFIELD BARRACKS MILITARY RESERVATION
OAHU, HAWAII

APRIL 2003

PREPARED BY:

29 Apr 03
PETER YUH, JR. Date
National Environmental Policy Act
Coordinator
Directorate of Public Works

REVIEWED BY:

30 Apr 03
FLOYD A. QUINTANA Date
Colonel, U. S. Army
Director of Public Works

SUBMITTED BY PROPONENT:

APR 30 2003
BURT K. THOMPSON LTC GS DG3 Date
Lieutenant Colonel, U. S. Army
Assistant Chief of Staff, G3

APPROVED BY:

1 May '03
DAVID L. ANDERSON Date
Colonel, U.S. Army
Commander, U.S. Army
Garrison, Hawaii

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF FIGURES

1. INTRODUCTION

This Environmental Assessment (EA) is prepared to comply with the substantive provisions of the Council of Environmental Quality (CEQ) National Environmental Policy Act (NEPA), 40 CFR Part 1500-1508, and the Department of the Army's Final Rule (32 CFR Part 651) "*Environmental Analysis of Army* Actions" to consider environmental consequences when authorizing or approving major federal actions. A list of federal laws and regulations that are or could be relevant to this EA is included in Appendix A.

2. PURPOSE AND NEED FOR THE PROPOSED ACTION

The U.S. Army Hawaii (USARHAW) is proposing to conduct a prescribed burn of portions of the Schofield Barracks West Range impact area. The purpose and need for the Proposed Action burn is to remove vegetation from the impact area to improve ground visibility necessary for accomplishing unexploded ordnance (UXO) clearance and archaeological surveys of the area. The UXO clearance and archaeological surveys are required to support completion of environmental impact analysis studies for the proposed Battle Area Complex (BAX) and Qualification Ranges being planned for the Stryker Brigade Combat Team (SBCT) at Schofield Barracks. Additionally, the prescribed burn is proposed to help minimize the risk of wildfires by reducing the existing vegetative fuel load in the range impact area. It is anticipated that subsequent annual prescribed burns would be required to help maintain and reduce vegetative hazard fuel loads.

3. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

a. Proposed Action - Prescribed Burn. The Proposed Action would be to conduct a prescribed burn to clear vegetation from approximately 485-607 hectares (1,200-1,500 acres) of the Schofield Barracks West Range impact area, see Figure 1. The prescribed burn area would be divided into three separate and distinct prescribed burn units. Burn Unit 1 is located in the southwest section of the West Range impact area; Burn Unit 2 (and 2A) is in the central and northeast section of the impact area; and Burn Unit 3 is in the south central section of the impact area. All the proposed burn unit areas are completely circumscribed by the Schofield firebreak road, Trimble Road, and existing interior range road network.

(1) Pretreatment. Prior to the prescribed burn, aerial broadcast of herbicide treatment (RoundupPro®) by helicopter would be applied to reduce live vegetation and augment the prescribed burn. The proposal to use chemical herbicides as a pretreatment prior to the prescribed burn was due to the proposed timing of the burn, early summer, necessitating the need to augment and accelerate the natural seasonal drying process of the vegetation to be burned. Historically, wetter climates are experienced the latter and early months of the year (November-March), during which time rapid vegetation growth occurs, resulting in the build up of vegetative fuel loads. This is followed by a transition period to drier climates in the summer when moisture content in the vegetation gradually reduces. While controlled burns are typically conducted during the dry summer months (July-September), the proposed schedule would be to conduct the herbicide application and burn in the May-June time frame. The reason for conducting the burn

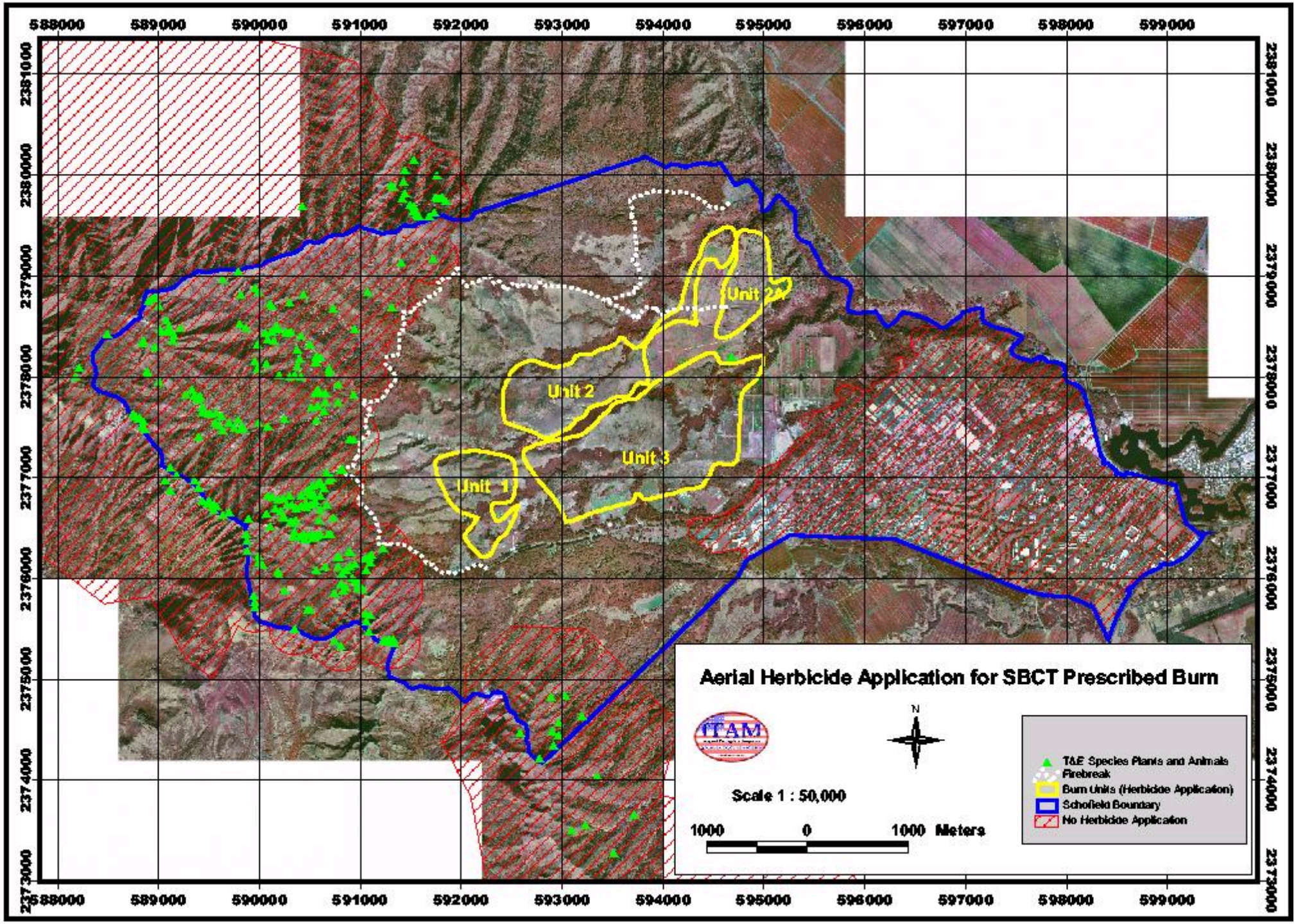


Figure 1, Schofield Barracks Prescribed Burn Area

earlier than normal is to ensure the Proposed Action is completed prior to scheduled heavy usage of the training ranges during the summer, and to allow timely completion of studies required for the SBCT environmental impact analysis. Chemical herbicide pretreatment will increase the likelihood that the proposed burn would be successful and meet burn objectives. The pretreatment will help to avoid less effective burns such as the prescribed burn at Makua Military Reservation during the month of October/November 2002. The Makua burn was only partially successful in meeting its burn objectives due to wet conditions. Because the proposed burn areas are within the range impact area, herbicide application can only be done by aerial application. More in-depth description of the aerial herbiciding procedures is provided in the Aerial Validation Plan for Herbicide Application, which is included as Appendix B.

(2) Prescribed Burn Operations. The USARHAW has prepared a prescribed burn plan (See Appendix C) that describes how the prescribed burn will be conducted, and includes explanations of responsibilities, equipment support, fire prescription, weather constraints, contingency operations, risk assessment, and safety procedures. It is expected that the prescribed burn would be conducted over a 5-6 day period. The following paragraphs briefly summarize some of the key components of the prescribed burn plan:

(a) Test Burns. A test burn in each burn unit would be conducted each day to evaluate fuel consumption, fire behavior, and smoke dispersal prior to conducting the prescribed burn. The prescribed burn would commence if the criteria for the burn conditions were met. The USARHAW Installation Fire & Safety Office would notify appropriate agencies prior to ignition, fire escape or potential problems, and provide status reports at the end of each day.

(b) Ignition Protocol. Upon completion of the test burn, and when weather conditions are favorable, the prescribed burn ignition would be initiated using multiple strip firing techniques ignited by use of plastic spheres dispensed from an Aerial Ignition Device (AID) attached to a helicopter. The AID is a mechanical dispenser (PREMO MK III) that injects antifreeze (ethylene glycol) into a plastic sphere ("ping pong ball") containing potassium permanganate. An exothermic reaction occurs within the activated "ping pong balls," which are dropped from the helicopter onto vegetation below to start the fire. Additionally, drip torches would be used to augment aerial ignition. The use of drip torches involves walking along the firebreak road or within units and manually igniting vegetation.

(c) Fire Containment and Control. All fires would be controlled to avoid spreading outside the designated burn areas. The Schofield Barracks West Range Firebreak Road network and Trimble Road would serve as the primary fire containment line. The Firebreak Road and other interior range roads would be improved so that they provide a minimum 15-20 foot wide fuel free roadway and sufficient access for wildland fire fighting vehicles. The range roadway network would serve as anchor points for holding crews to prevent fire escape. Equipment and personnel designated to support fire-fighting operations would include:

- Two (2) HMMWV's equipped with pumps and foam proportioners.
- Two (2) Brush Engines for patrol.

- Two (2) water tankers with minimum 1000-gallon capacity
- One (1) helicopter dedicated for PREMO Mark III Aerial Ignition Device
- Two (2) UH-60 helicopters on site equipped with fire bucket and Sacksafoam II or III
- One (1) CH-47 helicopter on standby at Wheeler Army Airfield, with 30-minute leash
- Two (2) portable flexible water tanks (3000-gal capacity)
- Two (2) reserve fire buckets
- One 21-man firefighting detail to supplement fire department crews.

Portable flexible dip tanks would be filled on-site to full capacity prior to firing in support of helicopter fire bucket operations. Two UH-60 helicopters, equipped with fire buckets, would be located on-site should emergency fire fighting response be necessary. A CH-47 helicopter would be on standby and stationed at Wheeler Army Airfield in case it is needed to provide additional emergency fire-fighting response. The helicopters would obtain water from approved water reservoirs (e.g., Helemano Reservoir, Opaeula Reservoir, etc.). Holding crews and two HMMWV's would be pre-positioned on the Firebreak Roads to watch for and perform quick attack on any slopovers that may occur. The water tanker would be pre-positioned to provide water re-supply to HMMWV's and brush engines. After the fire is declared out, a crew would remain in the area for a cool down period before being released.

(d) Fire Escape Procedures. Should a fire escape beyond the Schofield Barracks West Range Firebreak Road or Trimble Road, it would be considered a wildfire and all burn actions would cease until after the escaped fire is under control. The Prescribed Fire Manager would immediately implement the prescribed burn contingency plan and notification procedures. All available assets would respond to assist fire crews to suppress the wildfire. On-site helicopters with fire buckets would be utilized in all fire suppression activities and respond as part of the initial attack. The CH-47 on 30-minute standby at Wheeler AAF would respond when requested by the Prescribed Fire Manager and/or Incident Commander. Federal and City and County Fire Departments would support any emergency fire fighting response requirements as requested.

(e) Use of Fire Retardant. The Army would use a liquid concentrate (LC) fire retardant manufactured by Fire-Trol® as a fire suppression agent and retardant control line to contain fire within specific burn areas. It is effective for three days after application, unless there is heavy precipitation and is washed away. Thereafter, it begins to biodegrade and becomes comparable to a mild fertilizer. Fire-Trol® is an environmentally safe fire retardant used by the U.S. Forest Service. The retardant is stored in 55-gallon drums and needs to be mixed with water to become effective. The Army would construct a 5,000-gallon storage tank that would allow mixing of retardant and water and to hold the retardant. A fire bucket attached to a helicopter would be lowered into the storage tank and filled with the LC retardant. After the bucket is filled, the helicopter would proceed to apply the LC to create a retardant line. The retardant contains a red-colored dye to visually ensure that the helicopter crews apply a continuous retardant line.

b. No-Action Alternative. Under the No-Action Alternative, the U.S. Army would not conduct a prescribed burn to clear vegetation to allow UXO clearance and archaeological surveys of the Schofield Barracks West Range impact area. The existing fuel load would remain

and continue to increase as a fuel source for potential accidental ignitions as a result of future military training activities in the area.

c. Alternatives Considered But not Carried Forward

(1) Chemical Treatment Alternative. Chemical application of herbicides is a method of eliminating vegetation. Although chemical treatments may be effective in controlling vegetation, the herbiciding alone would only kill vegetation and not result in its immediate elimination. Without adequate removal of vegetation, this alternative may not allow the safe UXO removal operations and subsequent archaeological survey because dead vegetative cover would still remain obscuring ground visibility. Additionally, vegetative fire fuel load would still remain and not help reduce the risk of accidental range fires. Because this alternative would not fulfill the purpose and need of the action to clear vegetation from the impact area to successfully allow UXO clearance and archaeological surveys, it was dismissed from further evaluation.

(2) Mechanical Clearing Alternative. Mowing or cutting down vegetation is an alternative method for removing vegetative cover. However, because the areas to be cleared are in the training range impact area with the presence of UXO, it would be unsafe for personnel to enter these areas making this option impractical and unfeasible. Therefore, this alternative was not considered viable and dismissed from further evaluation.

4. AFFECTED ENVIRONMENT

a. Topography and Soils.

(1) Schofield Barracks Military Reservation (SBMR) is located on the central plateau of Oahu, on the eastern slopes of the Waianae mountain range. The topography of this area transitions from relatively flat terrain in the main cantonment area and fringing range facilities, gradually increasing in slope through the SBMR West Range impact area up to the steeper elevations of the Waianae Range. Elevations range from approximately 201 meters (660 ft) in the cantonment area to 915 meters (3000 ft) in the Waianae Range.

(2) According to the United States Soil Conservation Service 1972 study, *Soils Survey of Islands Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, there are four soil associations that can be found at SBMR. The mountainous areas and low slopes of the Waianae Range reflect the volcanic history of the area and include Tropohumults-Dystrandepts soils, as well as Mahana, Kolekole, Helemano, Kemoo, Kawaihapai and Alakai soil types. Soils in these areas are well-drained and often underlain by soft weathered rock, volcanic ash or colluvium. Soil erosion is significant in areas where natural drainage and gulches occur. Helemano Silty Clay, 30-90 percent slope, normally found on sides of gulches that cross the SBMR West Range impact area, is highly erodible soil. However, the relative dry climate and lack of permanent streambeds reduce the amount of erosion, as well as in those areas where soils are not well developed because of exposed lava. The Army's Integrated Training Area Management (ITAM) program uses land management practices and erosion control measures to stabilize and minimize soil erosion.

b. Surface Water Resources. There are four intermittent streams on SBMR that cross portions of the Schofield Barracks West Range impact area: Haleauau Gulch, Mohiakea Gulch, Waikoloa Gulch, and upper Waikele Stream. Waikele Stream flows into Pearl Harbor to the southeast, while the streams are tributaries to Kaukonahua Stream, which flows along the installation's northeastern boundary and eventually into the Pacific Ocean at Waialua to the north. Drainages in the northeastern portion of the installation are considered state of Hawaii Class 1 waters. All other streams are State Class 2 waters. All streams are somewhat degraded affected by the impact area and associated erosion. Stream quality is also affected by non-point agricultural pollution from adjacent pineapple fields and other croplands.

c. Climatology and Air Quality.

(1) The average rainfall at SBMR varies with elevation and exposure; the averages inland at higher elevations of SBMR are considered representative of the island averages and usually exceed 50 inches annually. The overall average for SBMR is 1111 mm (43.75 in). The spring/summer (April-October) monthly average rainfall is 41 to 96 mm (1.63 to 3.78 in), and for fall/winter (November-March) months the range is 105 to 158 mm (4.14 to 6.21 in) (USACE and Nakata Planning Group 2000). Prevailing winds are northeasterly trade winds from 4 to 12 miles per hour (mph) in the warmer summer months, and lighter southeasterly winds prevail in winter months. Droughts and the risk of fire danger increase in the summer and early fall on Oahu.

(2) The entire state of Hawaii is an attainment area for all criteria pollutants under the Clean Air Act. There are nine air-monitoring stations that measure ambient air quality on the island of Oahu. The closest air quality monitoring station for SBMR is in Pearl City, which is located approximately 10 miles southeast of SBMR. The ambient air quality in the SBMR area is considered to be good due to strong trade wind conditions. Common sources of air pollution in the area are from emissions from transportation sources, dust and dirt from bare soil areas, pollen from plants, and smoke from munitions and dust from explosions during training exercises. Another source of air pollution in the region comes from occasional open burning of pineapple fields that are located to the north and south of SBMR. These agricultural burns along with accidental training range fires affect air quality by releasing fine particulate matter (ash and dust) and gases (carbon monoxide, carbon dioxide, methane) into the atmosphere. With exception to instances during New Year fireworks celebrations, ambient air quality in the State of Hawaii is almost always below the National Air Quality Standards.

d. Noise Environment. Noise in the vicinity of the SBMR West Range is dominated by military training activities. These activities include vehicles operations, small arms firing, and mortar and artillery explosions, which normally occur during the daylight hours throughout the week and on occasions at night. The noise environment is also influenced by helicopter and fixed-wing aircraft entering the Wheeler Army Airfield airspace, over flying the western portion of SBMR. The nearest noise sensitive areas are Bowen Park and family housing located about 500 meters from the southeast corner of the propose burn area.

e. Access and Traffic. Schofield Barracks is accessible via the H-2 Freeway and Kamehameha Highway. The Schofield West Range area is accessed by Beaver Road, which

connects to Trimble Road, a 4-lane primary connector roadway that bisects the main cantonment area and links with Foote Avenue and the main entrance to the installation. Trimble Road also borders the southern boundary of the West Range area and provides direct access to some of the ranges along that boundary. This portion of Trimble Road is a 2-lane roadway that connects Schofield Barracks to Lualualei Naval Reservation via Kolekole Pass. Traffic along this portion of Trimble Road is light and infrequent.

f. Hazardous and Toxic Materials. The following information has been obtained from the *Preliminary Assessment Report and Sampling and Analysis Plan for Operable Unit 3, Schofield Barracks, Island of Oahu, Hawaii*, *Feb 1993*, which was prepared for the U.S. Army Toxic and Hazardous Material Agency by Harding Lawson Associates. The preliminary assessment was conducted on the three range areas that comprise the SBMR West Range complex--McCarthy Flats, Central, and Kolekole Ranges. The following are brief descriptions of the ranges and findings of the report.

(1) McCarthy Flats (MF) Ranges.

(a) The MF ranges are located along the northeast section of Beaver Road below Haleauau, Mohiakea, and Kaukonahua Gulches. There are four subranges, MF-2 through MF-5, which were established in the early 1950's; a fifth, MF-7, constructed at the same time, was later abandoned. These ranges are used for small arms, machine gun, grenade, artillery, and light antitank weapon training. Firing points are located adjacent to some of the ranges, including one north of the complex (Firing Point 308), all of which fire into the central impact area.

(b) Herbicides have been used in the past on portions of the ranges to control growth of vegetation. The primary hazardous material concern is the presence of UXO and the possible contamination of surface soil with lead, metal, and other explosives. Locations of ranges and impact areas have varied over the years, and the impact area at one time was larger and may have encompassed areas currently not indicated as the impact area. Little evidence of use or release of materials such as fuel, oil, paint, or solvents was found at these ranges.

(2) Central Ranges (CRs).

(a) The CRs are located near the intersection of Beaver Road with Oahu and Hawaii Streets between the main cantonment area and the West Range impact area. The ranges were established as CR-1 through CR-5 in the early 1950's, but were consolidated and reconfigured in 1984 to four subranges designated as CR-1, CR-02, CR-2A, and CR-3. These ranges are used for small arms, machine gun, grenade, artillery, and light antitank weapon training. Firing points are located adjacent to some of the ranges for firing into the central impact area.

(b) Herbicides have been used in the past on portions of the ranges to control growth of vegetation. The primary hazardous material concern is the presence of UXO and the possible contamination of surface soil with lead, metal, and other explosives. Locations of ranges and impact areas have varied over the years, and the impact area at one time was larger

and may have encompassed areas currently not indicated as the impact area. Past interviews indicated that areas down range of CR-2 and CR-3, such as Mohiakea Gulch in the impact area, were used to burn and dispose waste ordnance materials. A 1981 aerial photograph of the area confirms the presence of a dump site at the west end of then CR-3. Little evidence of use or release of materials such as fuel, oil, paint, or solvents was found at these ranges.

(3) Kolekole Firing Ranges (KRs).

(a) The KRs are located along the southern border of the West Range impact area and are accessible from Trimble Road near Kolekole Pass in the Waianae Mountain Range. Ranges KR-1 through KR-5 have been in use since the 1930's, and Ranges KR-6 through KR-9 have been in use since the 1950's. These ranges are used for small arms, machine gun, grenade, artillery, and light antitank weapon training. Firing points are located adjacent to some of the ranges for firing into the central impact area. Additionally, the Military Operations in Urban Terrain (MOUT) Assault Course (MAC), is a part of the KR complex on the western edge of the SBMR West Range.

(b) Herbicides have been used in the past on portions of the ranges to control growth of vegetation. The primary hazardous material concern is the presence of UXO and the possible contamination of surface soil with lead, metal, and other explosives. Locations of ranges and impact areas have varied over the years, and the impact area at one time was larger and may have encompassed areas currently not indicated as the impact area. It was noted that KR-8 and KR-9 were suspected of containing the majority of the UXO as the other ranges are used primarily for light weapons firing inert projectiles. Additionally, it was identified that areas downrange from KR-2 were previously used for UXO disposal. Little evidence of use or release of materials such as fuel, oil, paint, or solvents was found at these ranges.

g. Vegetation and Fuel Loads.

(1) During baseline surveys in 1993, the Hawaii Natural Heritage Program (HIHNP) delineated the habitat types that lie within SBMR. The ecological zones and natural communities found within SBMR are described below. While these native ecological zones are present, the majority of SBMR is dominated by alien vegetation.

(a) Wet Summit Crest Zone. The zone lies above 900 meters (approx. 3,000 ft) elevation in the summit crest areas of Mount Kaala, Puu Kalena, and Puu Hapapa in the Waianae Mountains. Prevailing conditions in this zone are cool, usually wet, windswept, and often cloud-shrouded The topography varies from cliffs to moderate slopes and is characterized as Ohia Montane Wet Forest.

(b) Mesic Ridges and Cliffs Zone. This ecological zone dominates the upper to middle elevation portions of SBMR. During the HIHNP survey of SBMR, personnel observed that the sharp ridges along the crest of the Waianae Mountains below 900 m (approximately 3,000 ft) were not as cool or wet as the wet summit crest ecological zone. They were warm and mesic but still windswept. The steepest cliffs and slopes in these areas were found to support Ohia Lowland Mesic Shrubland and Kawelu Lowland Mesic Grassland.

Examples of these ecological zones are the Puu Kamaohanui and Puu Kumakalii areas, which lie along major ridges.

(c) Lowland Forest Zone. The majority of SBMR falls within this zone. Specific habitat types identified in this zone include Koa/Ohia Lowland Mesic Forest, which generally occupies ridgetops; Oahu Diverse Lowland Mesic Forests, which generally are on north-facing, steep to moderate slopes; and Ohia Lowland Wet Forest, which is present at the upper end of the elevation range of the lowland forest zone and is thus wetter in character.

(2) The proposed burn units all fall below the SBMR West Range firebreak road within the impact area and McCarthy Flats range area. Due to the live fire training that occurs around and into the impact area, there is a high level of disturbance. The primary disturbance is the frequent ignition and subsequent spread of fire. This has resulted in a vegetation community that is dominated by non-native fire adapted species. The area below the firebreak road within the impact area has large open areas dominated by *Panicum maximum* Jacq. (Guinea grass), *Leucaena leucocephala* (haole koa), and *Melinis minutiflora* P. (molasses grass). These open areas are subdivided by gullies that in turn are dominated by *Shinus terebinthifolius* Raddi (Christmas berry) and *Eucalyptus spp.* (eucalyptus).

(3) The Army has significantly improved its fire management program with the development of a comprehensive Wildland Fire Management Plan (WFMP). The WFMP continues to be a working document and is updated as new information and techniques become available to make it more effective. All fire-planning efforts consider impacts of fire pre-suppression and suppression activities on the natural and cultural resources, including rare and endangered species (25th ID (L) and USARHAW 2001a).

h. Threatened and Endangered Species.

(1) The following significant species are located at SBMR, however, all are outside of the proposed burn area:

- 29 endangered plants.
- 1 endangered tree snail (*Achatinella mustelina* - Oahu tree snail).
- 1 proposed endangered bird (*Chasiempis sandwichensis ibidis* - Oahu elepaio*)*
- 1 endangered bat (*Lasiurus cinereus semotus* - Hawaiian hoary bat)
- 1 threatened plant (*Isodendrion longifolium* – Aupaka)

(2) The only designated critical habitat that falls within SBMR is for the Oahu elepaio. This is located above the West Range firebreak road and outside of the proposed burns. There is one documented location for elepaio that occurs approximately 30 meters inside the firebreak road within a wooded gulch. This site has a very low fire risk due to the amount of moisture and the lack of fine fuels. Historically, there is no record of this area burning and it falls approximately 800 meters from the nearest burn unit.

i. Historic and Archaeological Resources.

(1) Historic Overview.

(a) Hawaiians lived in the central plateau area of Oahu hundreds of years before European contact. In precontact times, the area had large villages and extensive agricultural complexes in order to support a large population and a political center at Lihue (Tomonari-Tuggle 1997, 2002).

(b) The boundaries of SBMR, with the inclusion of the northern part of WAAF, correspond with the traditional Hawaiian land unit called Waiʻanae Uka, a land-locked portion of the ahupuaʻa of Waiʻanae, which extended from the top of the Koʻolau Mountains across the Waiʻanae Mountains to the west coast of Oʻahu. Stretching across the central plateau in a long, band from the top of the Koʻolau Range to the top of the Waiʻanae Range, this land unit was relatively isolated from the rest of its ahupuaʻa. As a result the trail that connected Waiʻanae Uka with Waiʻanae Kai, the coastal portion of the ahupuaʻa, by way of Kolekole Pass, was of strategic importance. Kolekole Pass is not far from the base of Mount Kaʻala, the highest summit on Oʻahu, an important place in Hawaiian religion, ceremony, legend, and perhaps celestial observations. Waiʻanae Uka is known in Hawaiian traditions as an important training ground for chiefs and was the location of important prehistoric battles. Archaeological evidence indicates the presence of traditional Hawaiian agricultural field systems, both dry land and irrigated taro wetland fields (loʻi) along the streams that flow through SBMR. Three heiau are known to have been located in the area, although remnants of only one have survived to be archaeologically recorded. While no specific places associated with the use of this area as a training ground for warriors have been found, oral histories recount this use of the area for these purposes and there are stories of longhouses stretching across the plateau (SRP 2003). The area around Kolekole Pass was used by young students studying the art of lua, which involved dislocating joints and replacing them (Alvarez 1982, 6).

(c) In probably the mid to later 1600s the Oʻahu paramount chief Kualiʻi led his armies against the rebellious chiefs of ʻEwa and Waialua at a battle on the land of Kalena and the plain of Haleʻauʻau in what would now be the West Range Impact Area on the Main Post (Fornander 1969, II-281).

(d) Early historic descriptions indicate that lush native forest covered most of the plateau lands between the stream valley farms. These forests may have been used to hunt birds for food and feathers and to gather other upland resources, especially valuable woods such as koa and sandalwood. Between about 1816 and 1830, under the direction of the Hawaiian chiefs, these forests were intensively cut to obtain sandalwood, one of the main components of this forest, to be traded to China (Kamakau 1992). In the 1830s a missionary described the area as one of "nearly naked plains" (Bishop 1916, 45). After the sandalwood boom ended, wood may still have been gathered as firewood to stoke the boilers of the whaling ships that called at Honolulu Harbor over the subsequent 40 years (Kuykendall 1968). The grasslands that developed following deforestation were used to raise cattle, with the crown from 1850 leasing much of the ahupuaʻa to rancher John Meek to raise cattle, sheep, and horses.

(e) At the time of the Great Mahele (a land distribution procedure discussed in Section 3), all of Waiʻanae ahupuaʻa was claimed as crown lands by Kamehameha III. Thus there are no commoner claims or testimonies to provide evidence of the cultural use of the area at that time. Half of the ʻili of Kalena along Kalena Gulch was claimed by the aliʻi Pahoa and the other half was awarded to John Meek. Kalakaua established Leilehua Ranch, building a house at the location of the present golf course clubhouse in the SBMR cantonment area. However, some small-scale agriculture must have continued in the stream valleys at least through the middle part of the century, as early missionary records indicate the presence of villages large enough to support schools on the central plateau. James Dowsett owned the land that is now the Main Post in the late 1800s and operated it as a ranch. After the annexation of Hawaiʻi in 1898, the United States took possession of the property and in 1909 established Schofield Barracks as a base for mobile defense troops. Construction began in 1913. Runways were added to the installation in 1914, and several schools were developed before and during World War I. Upon the end of the war the Hawaiian Division was established at SBMR, and substantial installation improvements were made (Tomonari-Tuggle and Bouthillier 1994).

(f) In the late 1930s defense mobilization increased, and the installation's population swelled to 20,000. More construction took place, including the excavation of underground tunnel complexes. During World War II, SBMR became the Army's single largest garrison. Massive mobilization took place all over the islands, and SBMR housed tens of thousands of servicemen and women (Tomonari-Tuggle and Bouthillier 1994).

(h) After the war, the Hawaiian Infantry Training Center was established at SBMR, and upon the end of the Korean War the 25th Infantry Division returned to its home post at SBMR, where it has remained the principal occupant, although it shares the post with other brigades from the Hawaiʻi National Guard and the US Army Reserves. The Army constructed a great deal of housing on the former open space areas at the west end of the cantonment area and built more housing during the late 1950s and 1960s (Tomonari-Tuggle and Bouthillier 1994).

(2) Previous Archaeological Surveys.

(a) Previous archaeological survey work in the SBMR cantonment area has been conducted by Bouthillier et al. (1995), O'Hare et al. (1993), McIntosh et al. (1995a, 1995b), and Williams et al. (1995). Most recently, Robins and Spear (2002a, 2002b) conducted a two-phase survey in the West Range and South Range of SBMR. Robins and Spear surveyed selected areas, including limited subsurface sampling. Approximately 470 acres (190 hectares) in the South Range and approximately 173 acres (70 hectares) in the West Range have been surveyed on foot. Aerial survey was conducted of additional areas in the Impact Area (Robins and Spear 2002a, 2002b). They identified 82 archaeological sites, which included three heiau, 12 habitation sites, 56 agricultural sites, nine historic ranching, plantation, and military sites, and two sites of uncertain age. Twenty-nine archaeological sites were identified in the Schofield Barracks West Range. Of these, 24 are traditional prehistoric and early historic Native Hawaiian sites, two are Native Hawaiian historic period sites, two are historic sites, and one is of unknown age. The sites of Native Hawaiian origin include heiau, agricultural terraces, ʻauwai (irrigation channels), fishponds, enclosures, stone alignments, and roads. Most are located in the

stream gulches. The Schofield Barracks South Range has a total of 53 known archaeological sites. These consist of 45 traditional Native Hawaiian prehistoric or early historic sites, five historic period sites, one military site, and two sites of unknown period. Most sites are located in the stream gulches where they are at least partially protected from the impact of training activities on the plateau lands above (Anderson 1998, Robins and Spear 2002a, 2002b).

(b) Pedestrian surveys were conducted in 1997 and 1998 in three small areas in the gullies in the proposed burn area and the remainder of the project area was surveyed by low-level helicopter over flights due to the presence of unexploded ordnance. These surveys resulted in the location of six sites in the gullies. All the sites appeared to be associated with Native Hawaiian agricultural activities. No sites were observed on the upper levels of the Impact Area.

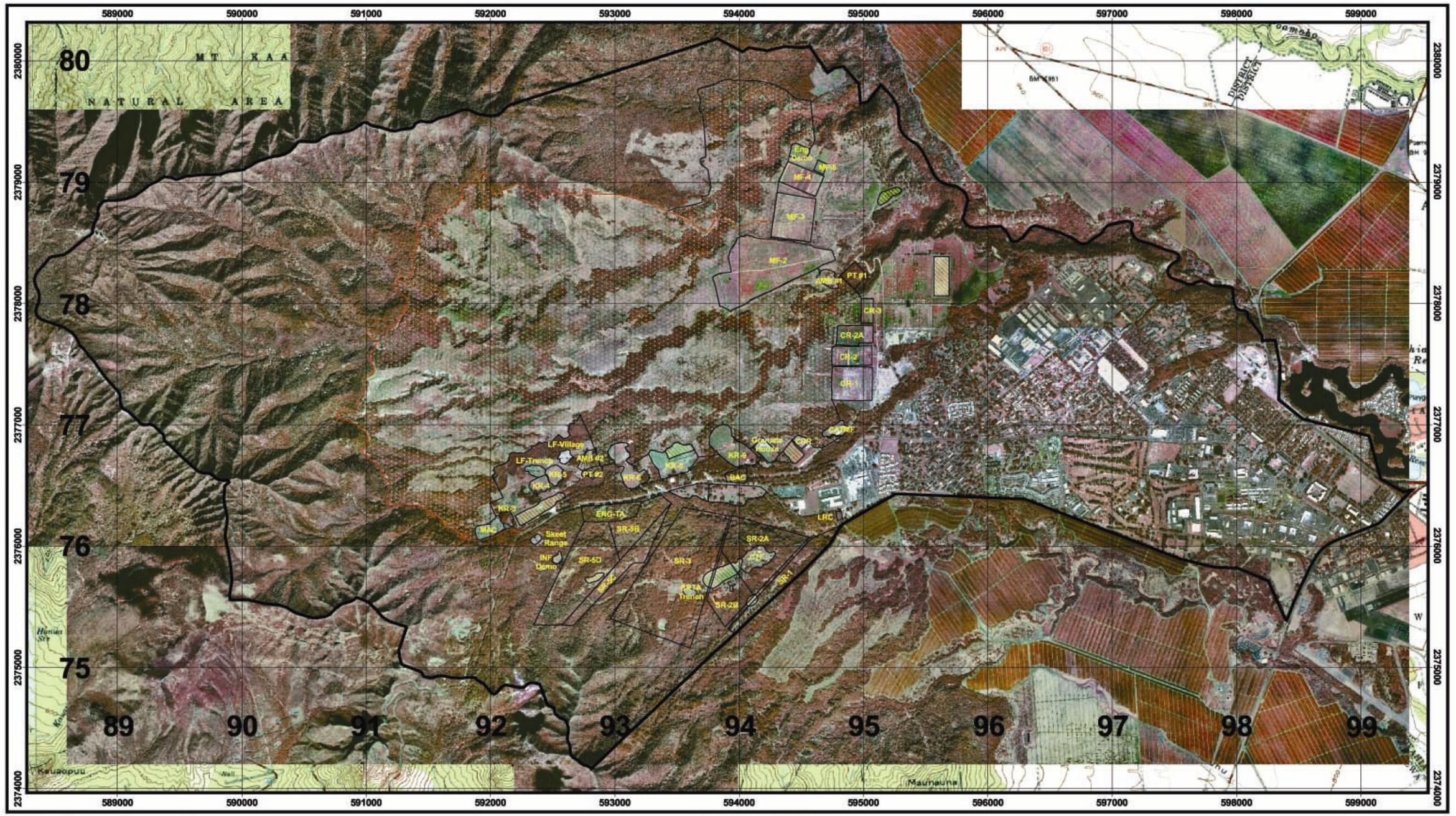
j. Land Use.

(1) Schofield Barracks Military Reservation is located in central Oahu, west of the town of Wahiawa. It is bordered to the east by Wahiawa's Lake Wilson and Wheeler Army Airfield, to the north by private agricultural lands and the Mt. Kaala Natural Area Reserve, to the west by the Waianae Kai Forest Reserve on the Waianae crest, and to the south by Lualualei Naval Reservation, private agricultural lands, and state lands.

(2) The installation itself includes a main cantonment area, maneuver training areas, ranges, and impact areas. The cantonment area covers about 650 ha (1,605 ac) and includes troop housing, operational facilities, family housing, warehouses, training facilities, and community service facilities. There is approximately 500 hectares (1,235 ac) designated to support maneuver training (South Range); with an additional 609 hectares (1,506 ac) to support range and indirect fire activities, and a 1,130 hectares (2,780 ac) impact area (USACE and Nakata Planning Group 2000).

(3) Schofield Barracks West Range is the primary range complex for individual weapons qualification with limited light maneuver training areas. Training and live-fire impact areas are situated west of the cantonment area. The wooded eastern slope of the Waianae Mountain range is used primarily for tactical infantry maneuver training, including land navigation training. The West Range impact area, located on more rugged terrain west of the cantonment, is the main site for fire ranges practice on Oahu (USACE and Nakata Planning Group 2000). Small arms, machine gun, mortar, grenade, antitank, and limited short-range indirect fire artillery training are conducted in these firing ranges. The live-fire training facilities at SBMR are used year-round. Figure 2 shows the various ranges on SBMR. The following are descriptions of the range facilities at the West Range complex:

(a) CR-1, Automated Record Fire. CR-1 has nine firing points where soldiers may qualify their skills for day and night record firing with their M16A2 semiautomatic rifle. The weapon fires 5.56mm ball or tracer ammunition. Tracer rounds are used primarily at night to orient the shooters direction of fire. This range uses computer controlled and scored pop-up targets on nine lanes. Night fire is primarily for marksmanship development using tracer ammunition on targets under cover of darkness. Chemical light sticks



Schofield Barracks

Grid Zone Designation.....4Q
100,000m Square ID.....EJ
Grid.....1,000m UTMz4
G-M Angle.....11 deg (200 mils)

SCALE 1:25,000

500 0 500 1000 1500 2000 2500 3000 Meters

DATUM: NAD83
(North American Datum 83 is equivalent to WGS84)
Prepared and Published by the Integrated Training ARea Mangement (ITAM) Branch,
Schofield Barracks, Hawaii
Color Infrared (CIR) Imagery, February 1998

N

- Schofield Boundary
- Ranges
- Firebreak Road
- Impact Area
- LZ/DZ

Figure 2, Schofield Barracks Range Facilities

are usually placed on the targets to help the soldier acquire a sight picture. CR-1 is also configured for marksmanship training of the M224 60mm Lightweight Mortar and M29 81mm Mortar. The M224 fires a 60mm non-explosive, Short Range Training Ammunition (SRTA) round, while the M29 fires the 81mm SRTA mortar round.

(b) CR-2, Automated Field Fire. CR-2 has 10 lanes and is similar to CR-1 in that it is computer scored and operated for soldiers transition firing with their M16A2 semiautomatic rifle and the M224 and M29 Mortars SRTA rounds. In addition, it features a qualification table for the M2 .50 Caliber Machine Gun. This weapon system fires the .50cal SRTA round.

(c) CR-2A and CR-3, 25 Meter Zero. CR-2A and CR-3 are computerized ranges used to zero the M16A2 Semiautomatic Rifle, M240 Medium Machine Gun firing the 7.62 mm round, and the M9 Beretta Pistol firing the 9mm round (no tracer). Zeroing a weapon is necessary before going to one of the qualification ranges. 25 meters is the required distance for a soldier to find mechanical zero on his or her weapon. "Zero" is achieved when a soldier, having adjusted both front and rear sites, can place at least 6 shots within a small radius at the center of the target.

(d) MF-2, Multi-Purpose Machine Gun**.** MF-2 is not a computerized range. This is a machine gun and mortar range (automatic fire-lots of bullets in short bursts and ammunition is fed into gun in a belt configuration). This range supports M16A2 Semiautomatic Rifle which fires 5.56mm, M240 Medium Machine Gun which fires 7.62 mm, M2 .50 Caliber Machine Gun which fires .50cal and .50cal SRTA, M224 60m Lightweight Mortar which fires 60mm mortar SRTA rounds, and 81mm mortar SRTA rounds. All weapons on this range may use tracer rounds.

(e) MF-3, Record Fire. MF-3 Qualification Range – same as CR-1.

(f) MF-4, Zero Range. MF-4 is a 60 lane, manually scored range for soldiers to zero the M16A2 rifle and the M2 .50 Caliber Machine Gun SRTA rounds prior to moving to the qualification range. Soldiers fire at 10-meter targets at day or night, with or without using a protective mask (simulating the NBC attack). Uses of tracer rounds on this range are prohibited at this time.

(g) MF-5, Combat Pistol/Engineer Demolition. MF-5 is a military pistol qualification course. A demolition pit is also included with this range. The targets are controlled and scored by a computer. The range has 10 lanes with targets at 10, 13, 16, 17, 23, 27, and 31 meters from the firing line. The demolition pit is forward of the Combat Pistol Range uses shaping, cratering or bangalore charges up to 150 pounds maximum.

(h) Ambush Sites #1**.** This range supports use of a wide variety of weapons including: M16 Rifle, Medium Machine Gun, Military Pistol, Grenade launcher, Shot gun, and Claymore anti-personnel mines. Short-range training and tracer ammunition may be used on this range.

(i) Pointman Courses #1. This course is for squad level training where the pointman (first man in the formation) may get ambushed or encounters other enemy situations. This range supports use of a wide variety of weapons including: M16 Rifle, Military Pistol, and Shot gun.

(j) MAC, MOUT Assault Course (formerly called KR-1). The MOUT Assault Course is an urban combat training facility. Configured to look like a small village or town, it trains soldiers for urban warfare by entering buildings and rooms. Only blank ammunition is used at this facility. Pyrotechnics including smoke, illumination, and artillery and grenade simulators may be used outside the buildings in increase combat realism.

(k) Infantry Battle Course. KR-5 is a multi-use range used for different size elements and different elements and different weapons. Unlike the other ranges listed above where a single soldier (machine guns have 1 assistant gunners) firing the weapon, this range is set up for several firers. Range has 4 separate objectives to secure. This range can support the M16A2 Semiautomatic Rifle which fires 5.56mm, the M240 Medium Machine Gun which fires 7.62 mm, , MK19 40mm Machine Gun which fires 40mm, M224 and M136 AT4 Anti-Tank Weapon which fires 84mm. All weapons systems may be use a variety of ammunition types to include tracer, smoke, and illumination.

(l) LF Trench. The trench is a live fire, squad level course designed to prepare soldiers to secure a fighting trench with clearing and breaching techniques. The layout and design is similar to that employed at Makua Military Reservation. The concept includes two sets of legs with two hostile bunkers on each leg. The facility covers an area 50' x 125', with the trench 4'wide by 8' deep. Weapons employed here include: Small arms (5.56mm, 7.62mm, 9mm pistols), Grenades, (40mm training/practice (TP) with M-203 launcher, Fragmentation Grenades), and Mortars (60/81mm SRTA).

(m) LF Village. The village is a squad level series of building facades and structures to test proficiency in urban breaching, clearing, and cover by fire techniques. Weapons employed here include: Small arms (5.56mm & SRTA rounds, 7.62mm, 9mm pistols), Grenades, (40mm training/practice (TP) with M-203 launcher).

(n) Ambush Site #2. This range supports use of a wide variety of weapons including: M16 Rifle, Medium Machine Gun, Military Pistol, Grenade launcher, Shot gun, and Claymore anti-personnel mines. Short-range training and tracer ammunition may be used on this range.

(o) Pointman Course #2. This course is for squad level training where the pointman (first man in the formation) may get ambushed or encounters other enemy situations. This range supports use of a wide variety of weapons including: M16 Rifle, Medium Machine Gun, Military Pistol, Grenade launcher, Shot gun, 5.56mm short-range training ammunitions may be used on this range.

(p) KR-6, Squad Defense Course. This range can support the M16 Rifle, Medium Machine Gun, and Military Pistol, MK19 grenade launcher, .50 Caliber Machine

Gun (SRTA), 60/81 SRTA mortars, and Claymore anti-personnel mines. All weapons may use tracer or plastic tipped short-range training rounds.

(q) KR-8, Qualification/Familiarization. KR-8 has two firing positions each for AT4 Anti-Tank Weapon and the MK19 grenade launcher. They fire a 84mm rocket and 40mm high explosive/target practice round, respectively. This range also has two powder burn sites to dispose of unused propellant charges from mortars and artillery rounds.

(r) KR-9, Qualification/Familiarization. KR-9 has four firing positions for the M203 40mm Grenade Launcher. This weapon fires 40mm high explosive, smoke, and illumination rounds on this range.

(s) Grenade house. This range is configured to look like a single story building without a roof. A soldier trains to "clear" a room by first tossing or firing a live grenade into a room and following up with live pistol or rifle fire.

(t) Infantry Demolition Range. Has three pits to train infantry soldiers in the use of fragmentation grenades, and up to 1 lb demolition max per pit.

(u) Artillery firing points are positions for artillery guns to fire from. The mobile howitzers are towed to a point on the back of a vehicle. Once at the firing point the gun crew positions the gun tube to fire on a designated target. These points also support use of the lightweight mortar.

k. Socioeconomic Environment. Military personnel and expenditures have a substantial impact on the economy of Hawaii. The Hawaii State Department of Business, Economic Development and Tourism, State of Hawaii Data Book 2001 reported that federal defense expenditures totaled $3.971 billion, of which $1.282 billion was attributed to the Army. In the project area, expenditures at Schofield Barracks and Wheeler Army Airfield totaled $763.5 million. Statewide, the Army employed 16,345 active duty military and 4,455 civilians, with 12,944 military and 1,577 civilians of that total in the Schofield Barracks/Wheeler Army Airfield area.

l. Environmental Justice and Protection of Children.

(a) Identifying and addressing disproportionally high and adverse human health or environmental effects on minorities, low income populations, and children in the United States is required by Executive Order. For the purpose of this analysis, minority populations are defined as African American, American Indian, Asian and Pacific Islanders, and Hispanics. Low income populations are those persons at or below the poverty level.

(b) The SBMR is located in Honolulu County, Hawaii, which census data shows had a total of 876,156 persons in the 2000 census. Of the 876,156 persons, Asians were the predominant race (46%). The minority populations for Honolulu County were as follows: African American (2.4%), American Indian (<1%), Asian (46%) and Pacific Islanders (8.9%), and Hispanics (0%). Approximately 11.9% of the population in Hawaii is considered low

income based on the average percent of persons in poverty from 1997-1999 (25th ID (L) and USARHAW 2001b).

5. ANTICIPATED ENVIRONMENTAL CONSEQUENCES AND MITIGATION

a. Topography and Soils.

(1) Prescribed Burn: Under the proposed action the total acreage burned would be approximately 485-607 hectares (1,200-1,500 acres). Soils would become charred; however, the intensity of the burn would not be high enough to significantly or permanently affect the soils. Soils would be exposed once vegetative cover is burned off, which would increase the potential for soil erosion to occur. However, based on past observations of accidental burns, new vegetation arises within one month depending on weather conditions. Impacts to topography and soils would be short-term and temporary. Thus, there would be no significant impacts to topography and soils.

(2) No Action: No impacts are anticipated, as the existing conditions would remain.

b. Surface Water Resources.

(1) Prescribed Burn. Streams in the area are intermittent and are usually dry during the time a prescribed burn would be conducted. Chemicals proposed for use are considered "environmentally safe" (Hazardous and Toxic Materials for detailed discussion). No significant impacts on water resources are anticipated.

(2) No Action: No impacts are anticipated, as the existing conditions would remain.

c. Climatology and Air Quality.

(1) Prescribed Burn.

(a) Air quality impacts are expected to be short-term and temporary. As a result of the burn, small amounts of fine particulate matter and gases would be released into the atmosphere (e.g., ash, dust, carbon monoxide, and carbon dioxide). Local visibility in the immediate vicinity may be impaired by smoke or haze for the duration of the controlled burn. However, due to separation from developed areas, the burn operations should not create a significant impact to the public. Recent accidental range fires have resulted in some temporary and localized air quality impacts.

(b) The Army has coordinated with the State of Hawaii, Department of Health (DOH), Clean Air Branch and obtained approval for the burn (see consultation correspondence in Appendix D). DOH approved the prescribed burn pursuant to Hawaii Administrative Rules (HAR), Section 11-60.1-52, paragraph (b)(6) and requested that no burns occur during a no-burn period as provided in HAR Section 11-60.1-55. The no-burn period as

defined HAR 11-60.1-55 is determined by the Director when (1) meteorological conditions have resulted in a widespread haze on any island or in any district on the island; and (2) smoke from another/any adjacent district may impact on the affected district; or when a rise of the carbon monoxide level exceeds five mg/m^3 for an eight-hour average or the PM_{10} level exceeds 150 ug/m^3 for 24 hours. To minimize potential impacts, the Army will implement the mitigation measures identified below. No significant impact is anticipated.

MITIGATION: The Army will follow the stipulations called for by the DOH Clean Air Branch, and notify the City and County of Honolulu Fire Department or the Clean Air Branch prior to the prescribed burn to ensure compliance with HAR Section 11-60.1-55. The Army will also notify the Clean Air Branch if a change is made to the scheduled dates of the prescribed burn.

(2) No Action. No impacts are anticipated, as the existing conditions would remain.

d. Noise Environment.

(1) Prescribed Burn. The activities associated with implementing a prescribed burn would generate periodic noise primarily from helicopters and fire-fighting vehicles. A helicopter would also be used to apply the herbicide three weeks prior to the burn. Initiating the burn would involve the use of an Aerial Ignition Device (AID) to deploy from a helicopter. Fire-fighting vehicles, on standby, would be stationed near the cantonment area. Noise impacts would be short-term and no significant impacts are anticipated.

(2) No Action. No impacts are anticipated, as the existing conditions would remain.

e. Access and Traffic.

(1) Prescribed Burn. Vehicular traffic along Trimble Road may temporarily be disrupted should smoke from the burn obscure visibility of those portions of the burn area immediately adjacent to the roadway. Traffic in this area is light and infrequent. This impact would be short-term and no adverse long-term effect is anticipated. A safety concern to both motorists and pedestrian would be the potential for UXO to detonate and shrapnel (fragments) from the explosion injuring people or damaging vehicles. To reduce potential impacts, the Army will implement the mitigation measure below. It is anticipated there would be no significant impact on traffic.

MITIGATION: The Army will publicize when prescribed burns will take place and provide notice of when the portion of Trimble Road adjacent to the burn area would be temporarily closed.

(2) No Action. No impacts are anticipated, as the existing conditions would remain.

f. Hazardous and Toxic Materials.

(1) Prescribed Burn. The activities associated with the prescribed burn would use RoundupPro ®, drip torch fuel, a fire retardant, and an AID.

(a) Glyphosate, an active ingredient in the weed killer RoundupPro®, is slight to moderately toxic to fish and practically non-toxic to avian species and honeybees. Studies of the active ingredient in this product indicate that it is rapidly absorbed in the soil, readily biodegrades in soil and water, and does not bioaccumulate. A Material Safety Data Sheet (MSDS) on glyphosate can be found at Appendix E.

(b) Fuel used for the drip torches consist of a mixture of diesel and gas and are anticipated to be consumed in the fire and no residual fuel would remain after the fire. Short-term, isolated negative impacts to the environment could result from small spills or accidental release of fuels used in igniting the prescribed fires.

(c) The fire retardant, Fire Trol® Liquid Concentrate Retardant, would be applied in specific areas to help control the flames from spreading into areas not designated as burn areas. Fire Trol® is used by the U.S. Forest Service for wildland fires throughout the United States, and has been used in a recent prescribed burn at Makua Military Reservation in October 2002. Fire Trol® is considered "environmentally safe" and is biodegradable. A MSDS for this product can be found at Appendix E.

(d) An AID would be used to support ignition efforts. These "ping pong ball" spheres contain potassium permanganate, a strong oxidizing agent and ethylene glycol, an ingredient in antifreeze. MSDS for both products can be found at Appendix E. These products have also been used by the U.S. Forest Service for wildland fires and are considered "environmentally safe."

(e) It is unknown whether UXO present would detonate during the burn. Resident heat time in the soils is relatively short as fire passes but direct fire impingement on an exposed ordnance may cause detonation and/or fragmentation hazard. Detonation is dependent on various factors such as munition type and fire intensity; however, there is a potential for detonation.

(f) The Army will implement mitigation measures below to reduce potential impacts to the environment and no significant impacts are anticipated.

MITIGATION:

(a) The products to be used in support of the prescribed burn will be handled and stored in accordance with the manufacturer's instructions. Appropriate spill response equipment will be available at storage and transfer sites and fire-extinguishing equipment/media will be kept on hand in case of accidental ignition. The Army will also conduct daily operational and safety briefings to prevent accidents and injuries to personnel involved with the prescribed activities. To minimize the potential for runoff of products being

applied during herbiciding and burn activities, the Army will closely monitor weather forecasts and avoid conducting the prescribed burn activities if there is forecasted heavy rains or storms.

(b) The State Department of Agriculture provided response to the Proposed Action indicating that the herbed to be used, Roundup Pro, is not classified as restricted-use pesticide, and no permit is required. See correspondence in Appendix D.

(2) No Action: No impacts are anticipated, as the existing conditions would remain.

g. Vegetation and Fuel Loads

(1) Prescribed Burn . Under the Proposed Action, a total of approximately 485-607 hectares (1,200-1,500 acres) would be herbicided and burned. Implementation of the Proposed Action would result in the killing and burning of non-native grasses and other vegetation, primarily by *Panicum maximum* Jacq. (Guinea grass), *Leucaena leucocephala* (haole koa), and *Melinis minutiflora* P. (molasses grass). Additionally, vegetation within the gullies, which are dominated by *Shinus terebinthifolius* Raddi (Christmas berry) and *Eucalyptus spp.* (eucalyptus) would also be affected. This impact would be short-term and temporary as these non-native species have the capability for re-growth as observed from previous fires. There is a potential that drift from aerial application of herbicides may affect vegetation immediately surrounding the designated prescribed burn areas. Additionally, there is the potential for fire escape from the proposed burn areas. The designated burn areas are well within the West Range firebreak road, which is maintained to help contain any wildfires that may occur in the impact area.

MITIGATION:

(a) To control the potential for drift of herbicide to surrounding areas during aerial application, that applicator will be required to add drift retardant (Airex DC at 0.75%) to the spray (see MSDS in Appendix E). Additionally, application will only occur when wind speeds are between 2-10 mph and no precipitation. To further control the potential for drift of herbicides, the helicopter applying the herbicides will be limited to spraying no higher than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety.

(b) The Army will be prepared to apply a fire retardant around each burn unit to help contain the fire within the defined area and reduce the potential uncontrolled burn of the surrounding vegetation when required. The West Range firebreak road will provide a primary line of defense in the event of fire escape from the burn unit. The fire retardant lines will be tied in or anchored to established or improved roads.

(c) A Range Division representative trained by the fire retardant manufacturer will be on site to ensure that required concentration ratios are adequately mixed and applied properly and a refractometer will be utilized to determine proper concentration.

(d) The Army will strictly adhere to all elements outlined in the prescribed burn plan. Prior to ignition, prescription elements will be evaluated individually and collectively, against local weather forecasts and any other predicted conditions. Should any element fail to meet or exceed the limits, the prescribed burn will be suspended until all elements can be satisfied. Also, the Army will make arrangements to have personnel from the U.S. Forest Service provide oversight of the proposed prescribed burn.

(e) The Army will have one helicopter devoted to AID, and two helicopters on-site and one at Wheeler Army Airfield devoted to fire-fighting purposes.

(f) All Army personnel directly involved with the prescribed burn will receive firefighter and helicopter fire bucket certification. Military helicopter pilots and aircrew will attend an approved training program that includes, but is not limited to, fire behavior, tactics and bucket operations, aircraft performance considerations and planning, aircrew communications and coordination, and flight training and evaluation that focuses on water drops in mountainous terrain as well as water bucket pickup maneuvers over water reservoirs and open ocean.

(g) No significant impacts are anticipated with the implementation of the mitigation measures.

(2) No Action. Existing conditions would remain and the Army would not be able to clear UXOs and conduct archaeological surveys. Grasses and shrubs would continue to grow taller and obscure UXOs and also may be accidentally ignited during training activities, creating a fire hazard. The potential fire risk would remain because the high fuel load would still remain.

h. Threatened and Endangered Species

(1) Prescribed Burn.

(a) Higher elevation forests immediately upslope and to the west of the prescribed burn area contain a number of endangered plant species, and the elepaio (an endangered bird) and portions of its critical habitat. Implementation of the Proposed Action would have limited risk to threatened and endangered plants as all are located a significant distance away outside of the firebreak road, and at elevations where the cooler and wetter environment would inhibit the spread of wildfire. The one documented location for elepaio that occurs approximately 30 meters inside the firebreak road has a very low fire risk due to the amount of moisture and the lack of fine fuels. Historically, there is no record of this area burning and it falls approximately 800 meters from the nearest burn unit.

(b) In a letter from the U.S. Fish and Wildlife Service (FWS) dated 16 April 2003, the FWS concurs that this proposed prescribed burn is not likely to adversely affect federally listed species or adversely modify designated or proposed critical habitat (see Appendix D). This letter resulted from informal consultation under Section 7 of the Endangered Species

Act initiated by the Army 12 March 2003 with a letter and supporting documentation for the prescribed burn.

MITIGATION: Implementation of actions described in the Army's Aerial Validation Plan and Prescribed Burn Plan, and as summarized in section 5.7 above, would minimize risk to nearby plant and animal habitats. The Army will not proceed with aerial application operations if it is observed that there is risk of drift affecting elepaio Critical Habitat or areas occupied by threatened and endangered species. In addition, if burn prescription conditions are not fully satisfied for the prescribed burn to proceed, the scheduled burn will be suspended until all elements can be met. It is anticipated that there will be no significant impacts with the implementation of the mitigation measures.

(2) No Action. No impacts are anticipated, as the existing conditions would remain. However, the vegetative cover would still exist and continue to be a fuel for a wildland fire that may directly impact listed species and designated and proposed critical habitats.

i. Historic and Archaeological Resources. Cultural resources generally are not vulnerable to damage by fire itself but could be damaged by suppression activities. Fires of low intensity and duration, which are characteristic of the grassy fuels that dominate the training areas usually do not affect resources. Fire suppression activities, especially bulldozer lines and to a lesser degree, hand lines can damage cultural resources. Fire may aid in the discovery of undocumented cultural resources in that it removes vegetation that would otherwise obscure their presence.

(1) Prescribed Burn.

(a) Application of herbicide and burning of vegetation would improve ground visibility and would allow archaeological survey the of the impact area. The Army initiated Section 106 consultation on March 18, 2003 with the State Historic Preservation Officer (SHPO), State Office of Hawaiian Affairs (OHA), Oahu Burial Council, and Hui Malama I Na Kupuna O Hawaii Nei. The SHPO concurred that the Proposed Action will have "no adverse effect" on significant historic sites if the prescribed burn plan is followed, recordation of archaeological sites is completed, and additional consultation is implemented as needed. The OHA concurred with a "no adverse effect" determination if the Army follows the prescribed burn plan, and continues consultation on actions being taken to identify and protect cultural resources. Consultation correspondence is included in Appendix D

(b) The Proposed Action would entail clearing ground vegetation to allow UXO specialists safe access and follow-on archaeological survey. The determination of safe access would be done by a UXO specialist and would be dependent on how effective the burn is to allow ground visibility. If the UXO specialist determines that the survey can occur, archaeologists will conduct pedestrian surveys in the gully areas and low-level helicopter surveys of the plateau areas. UXO identification, tagging, and detonation will also occur as part of this action.

MITIGATION: After the burn has been completed, archaeologists will conduct pedestrian survey in the gullies located in the project area. Intensive mapping and GPS locational data will be completed for all sites located during the survey. No sub-surface testing will be done because of the presence of unexploded ordnance. The upper levels or plateaus in the project area will again be surveyed by low-level helicopter over flight. If unexploded ordnance is present near an archaeological site, and the ordnance cannot be moved before it is detonated, the site will be protected by the use of physical barriers. The Army will continue to keep the SHPO, OHA, and other interested parties informed of actions being taken to identify and protect cultural resources.

(2) No Action. There would be no impact as existing conditions would remain. However, the Army would not be able to perform UXO clearance and archaeological surveys needed to document presence of archaeological resources because the vegetation would still be present to obscure ground visibility and prevent safe access for UXO specialists to clear any UXO present. Subsequently, no archaeological surveys would be conducted.

j. Land Use.

(1) Prescribed Burn. SBMR is currently designated for military land use. The purpose of the proposed action is consistent with the land use designation and no impacts are anticipated.

(2) No Action. No impacts are anticipated, as the existing conditions would remain.

k. Socioeconomic Environment.

(1) Prescribed Burn. No impacts are anticipated, as this Proposed Action is located away from commercial businesses in the nearest town of Wahiawa.

(2) No Action. No impacts are anticipated, as the existing conditions would remain.

l. Environmental Justice and Protection of Children.

(1) Prescribed Burn. The activities associated with a controlled burn would generate short-term noise and air impacts. These impacts are not expected to be disproportionately high and adversely affect human health on minority and low-income populations and children.

(2) No Action. No impacts are anticipated, as the existing conditions would remain.

6. CUMULATIVE IMPACTS.

a. Cumulative impacts were analyzed for each resource category by adding past, present, and reasonably foreseeable future actions to the Proposed Action. The Proposed Action is to conduct a prescribed burn that would help the Army to conduct archaeological surveys and UXO clearing within the SBMR West Range impact area. In determining cumulative impacts of the Proposed Action, the following were taken into consideration:

(1) The Army plans to continue annual prescribed burns in the future to control fuel loads. NEPA documentation will be prepared.

(2) The SBMR West Range impact area is located away from developed areas and future development in the vicinity is not anticipated.

b. Anticipated cumulative impacts of the Proposed Action to the affected environment are:

(1) Topography and Soils. The Proposed Action would result in loss of vegetative cover thereby increasing the potential for soil erosion. However, this impact is anticipated to be short-term and temporary because new vegetation appears within a month depending on weather conditions. The Army's ITAM program develops various projects that help repair and maintain training ranges, including implementation of soil erosion control measures. Accordingly, no significant cumulative impacts on topography and soils are associated with the Proposed Action.

(2) Climatology and Air Quality. There is a potential for nearby agricultural field open burns in the general area at the same time as the prescribed burn. A combination of these nearby agricultural burns and the scheduled prescribed burn could result in a cumulative negative impact to air quality. However, due to the prevailing trade winds in Hawaii, location of the proposed area away from populated areas, and short-term nature of the proposed activity, it is not anticipated there would be a cumulative negative impact to air quality. No significant impacts are anticipated.

(3) Noise. The incremental increase in noise would not have a cumulatively significant impact. Noise impacts from the Proposed Action would be temporary and short in duration.

(4) Access and Traffic. The Proposed Action would have very little cumulative affect on traffic as there are no projects n the immediate vicinity of the proposed burn area. Traffic along Trimble Road in this area is light and infrequent, may be temporarily impacted from the smoke of the proposed burn but no significant cumulative impact on traffic would occur. The Army will be publishing notification of the burn to warn the installation populace and public of possible short-term hazards and scheduled temporary closure of Trimble Road during the time when the adjacent area is being burned.

(5) Hazardous and Toxic Materials. The Proposed Action would not have a significant cumulative impact related to hazardous and toxic materials since the Army would take precautions to properly use and handle hazardous and toxic materials. Spill response equipment would be on site to minimize harm. The materials proposed for use are considered "environmentally safe" or would be consumed in the fire.

(6) Vegetation and Fuel Loads. The Proposed Action would not have a significant cumulative impact related to vegetation and fuel loads. It is anticipated that new vegetation would appear within one month, depending on weather conditions.

(7) Threatened and Endangered Species. The Proposed Action is not likely to affect listed species or designated or proposed critical habitats. The prescribed burn would serve to protect listed species and native habitat found on the ridges by minimizing the opportunity for a wildland fire to escape during live-fire training. There would be no significant cumulative impact on biological resources.

(8) Historic and Archaeological Resources. There would be no significant cumulative impact on historic and archaeological resources. Fires of low intensity generally do not damage these resources and precautions would be taken to protect resources by strictly adhering to the prescribed burn plan.

7. CONCLUSIONS

a. Based on the Army's implementation of mitigation measures described in this EA, this EA concludes that the Proposed Action to conduct a prescribed burn to remove vegetation to allow safe access into areas and reduce fuel load does not constitute a major federal action having significant effects on the quality of the human environment. Furthermore, an Environmental Impact Statement is not required as defined by the Council of Environmental Quality (40 CFR 1500-1508) and the Department of the Army's Final Rule (32 CFR Part 651) "*Environmental Analysis of Army* Actions" and the Army intends to publish a Finding of No Significant Impact (FNSI).

b. Anticipated environmental consequences from the Proposed Action would result in temporary, short-term effects. The Army will implement the following mitigation:

(1) Air Quality. The Army will follow the stipulations called for by the DOH Clean Air Branch, and notify the City and County of Honolulu Fire Department or the Clean Air Branch prior to the prescribed burn to ensure compliance with HAR Section 11-60.1-55. The Army will also notify the Clean Air Branch if a change is made to the scheduled dates of the prescribed burn.

(2) Access and Traffic. The Army will publicize when prescribed burns will take place and provide notice of when the portion of Trimble Road adjacent to the burn area would be temporarily closed.

(3) Hazardous and Toxic Materials. The products will be used and stored in accordance with the manufacturer's instructions. Appropriate spill response equipment will be available at storage and transfer sites and fire extinguishing equipment/media will be kept on hand in case of accidental ignition. The Army will also conduct daily operational and safety briefings to prevent accidents and injuries to personnel involved with the prescribed activities. To minimize the potential for runoff of products being applied during herbiciding and burn activities, the Army will closely monitor weather forecasts and avoid conducting the prescribed burn activities if there is forecasted heavy rains or storms.

(4) Vegetation and Fuel Loads/Threatened and Endangered Species.

(a) To control the potential for drift of herbicide to surrounding areas during aerial application, that applicator will be required to add drift retardant (Airex DC at 0.75%) to the spray. Additionally, application will only occur when wind speeds are between 2-10 mph and no precipitation. To further control the potential for drift of herbicides, the helicopter applying the herbicides will be limited to spraying no higher than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety.

(b) The Army will be prepared to apply a fire retardant around each burn unit to help contain the fire within the defined area and reduce the potential uncontrolled burn of the surrounding vegetation when required. The West Range firebreak road will provide a primary line of defense in the event of fire escape from the burn unit. The fire retardant lines will be tied in or anchored to established or improved roads.

(c) A Range Division representative trained by the fire retardant manufacturer will be on site to ensure that required concentration ratios are adequately mixed and applied properly and a refractometer will be utilized to determine proper concentration.

(d) The Army will strictly adhere to all elements outlined in the prescribed burn plan. Prior to ignition, prescription elements will be evaluated individually and collectively, against local weather forecasts and any other predicted conditions. Should any element fail to meet or exceed the limits, the prescribed burn will be suspended until all elements can be satisfied. Also, the Army will make arrangements to have personnel from the U.S. Forest Service provide oversight of the proposed prescribed burn.

(e) The Army will have one helicopter devoted to AID, and two helicopters on-site and one at Wheeler Army Airfield devoted to fire-fighting purposes.

(f) All Army personnel directly involved with the prescribed burn will receive firefighter and helicopter fire bucket certification. Military helicopter pilots and aircrew will attend an approved training program that includes, but is not limited to, fire behavior, tactics and bucket operations, aircraft performance considerations and planning, aircrew communications and coordination, and flight training and evaluation that focuses on water drops in mountainous terrain as well as water bucket pickup maneuvers over water reservoirs and open ocean.

(g) The Army will not proceed with aerial application operations if it is observed that there is risk of drift affecting elepaio Critical Habitat or areas occupied by threatened and endangered species. In addition, if burn prescription conditions are not fully satisfied for the prescribed burn to proceed, the scheduled burn will be suspended until all elements can be met.

5. Historical and Archaeological Resources. The Army has consulted with the SHPO and has received concurrence that the Proposed Action will have "no adverse effect" on significant historic sites if the prescribed burn plan is followed, recordation of archaeological sites is completed, and additional consultation be implemented as needed. After the burn has been completed, archaeologists will conduct pedestrian survey in the gullies located in the project area. If unexploded ordnance is present near an archaeological site, and the ordnance cannot be moved before it is detonated, the site will be protected by the use of physical barriers. The Army will continue to keep the SHPO, OHA, and other interested parties informed of actions being taken to identify and protect cultural resources.

8. LIST OF PREPARERS, AND INDIVIDUALS AND AGENCIES CONSULTED

a. Preparers:

(1) Peter Yuh, Jr., National Environmental Policy Act Coordinator, Environmental Division, Directorate of Public Works, U.S. Army Garrison, Hawaii

(2) Joel Godfrey, Oahu Natural Resources Program Manager, Environmental Division, Directorate of Public Works, U.S. Army Garrison, Hawaii

(3) Laurie Lucking, Cultural Resources Program Manager, Environmental Division, Directorate of Public Works, U.S. Army Garrison, Hawaii

b. Individuals Consulted:

(1) Gayland Enriques, Deputy Fire Chief, Installation Fire and Safety Office, U.S. Army Garrison, Hawaii

(2) Debra Ikeno, Environmental Engineer, Environmental Division, Directorate of Public Works, U.S. Army Garrison, Hawaii

(3) Steve Lai, Range Planner, G-3/DPTM Range Division, 25th Infantry Division (Light)

(4) CPT Roger Miranda, Training Resource Manager, G-3, 25th Infantry Division (Light)

(5) Jeanne Prussman-Okerman, Environmental Law Attorney, Staff Judge Advocate, 25th Infantry Division (Light)

(6) Robin Yamamoto, Entomology Program Manager, Environmental Division, Directorate of Public Works, U.S. Army Garrison, Hawaii

c. Agencies Consulted:

(1) U.S. Army Environmental Center

(2) U.S. Department of Interior, Fish and Wildlife Service

(3) State of Hawaii Department of Land and Natural Resources, Historic Preservation Division

(4) State of Hawaii, Department of Health, Clean Air Branch

(5) State of Hawaii, Department of Agriculture, Pesticides Branch

9. REFERENCES

25th Infantry Division Light (L) and U.S. Army Hawaii. 2000. *Environmental Assessment and Finding of No Significant Impact for Work Plan for Test Burns at Makua Military Reservation (MMR), Pohakuloa Training Area (PTA) and Schofield Barracks (SB).*

25th Infantry Division (Light) and U.S. Army, Hawaii. 2001b. *Integrated Natural Resources Management Plan 2002-2006 and Environmental Assessment, Oahu Training Areas*. Center for Environmental Management of Military Lands, Colorado State University.

Alvarez, Patricia. 1982. *A History of Schofield Barracks Military Reservation.* Prepared for the Department of the Army, US Army Engineer Division, Pacific Ocean, Fort Shafter, Hawai'i.

Anderson, Lisa. 1998. *Cultural Resource Management Plan Report, O'ahu Training Ranges and Areas, Island of O'ahu, Hawai'i*. Prepared for the US Army Engineer District, Honolulu, Fort Shafter, Hawai'i. Ogden Environmental

Beavers, Andrew M., Robert Burgan, Francis Fujioka, Richard D. Laven and Philip N. Omi. 1999. *Analysis of Fire Management Concerns at Makua Military Reservation*. Center for Ecological Management of Military Lands, Colorado State University.

Beavers, Andrew M. 2001. Creation and Validation of a Custom Fuel Model Representing Mature *Panicum maximum* (Guinea Grass) in Hawaii. Center for Environmental Management of Military Lands, Colorado State University.

Bishop, Sereno. 1916. *Reminiscences of Old Hawai'i*. Hawaiian Gazette Co., Honolulu, Hawai'i.

Bouthillier, Katherine S., Scott Williams, and Tomasi Patolo. 1995. *Historic Preservation Measures for Inclusion in an Environmental Assessment of Proposed Family Housing Revitalization Projects at Sites A, U, V, and Duck Field, Schofield Barracks Military Reservation, Hawai'i*. Prepared for US Army Corps of Engineers, Corps of Engineers District, Honolulu, Fort Shafter, Hawai'i. Ogden Environmental and Energy Services Co., Inc,

Fornander, Abraham. 1969. *An Account of the Polynesian Race: Its Origin and Migrations*. Charles E. Tuttle, Rutland, Vermont.

Harding Lawson Associates. 1993. *Preliminary Assessment Report and Sampling and Analysis Plan for Operable Unit 3, Schofield Barracks, Island of Oahu, Hawaii.* Prepared for U.S. Army Toxic and Hazardous Material Agency.

Hawaii Natural Heritage Program. 1994. *Biological Inventory of the Schofield Barracks Military Reservation*. Hawaii Natural Heritage Program, The Nature Conservancy of Hawaii, Honolulu, Hawaii. (Unpublished).

Kamakau, Samuel M. 1961. *Ruling Chiefs of Hawai'i*. Kamehameha Schools Press, Honolulu, Hawai'i.

Kuykendall, Ralph S. 1968. *The Hawaiian Kingdom 1778-1854: Foundation and Transformation*. University of Hawai'i Press, Honolulu.

McIntosh, James, Timothy Denham, and Paul L. Cleghorn. 1995a. *Report of Archaeological Inventory Survey with Subsurface Testing for Work Area 1 of the Proposed Family Housing Project at Wheeler Army Airfield and Schofield Barracks Military Reservation, Wahiawa District, O'ahu Island, Hawai'i*. Prepared for the US Army Corps of Engineers, Corps of Engineers District, Fort Shafter, Hawai'i. BioSystems Analysis, Inc., Kailua, Hawai'i.

McIntosh, James, Timothy Denham, and Paul L. Cleghorn. 1995b. *Report of Archaeological Inventory Survey with Subsurface Testing for Work Area 2 of the Proposed Family Housing Project at Schofield Barracks Military Reservation, Wahiawa District, O'ahu Island, Hawai'i*. Prepared for the US Army Corps of Engineers, Corps of Engineers District, Fort Shafter, Hawai'i. BioSystems Analysis, Inc., Kailua, Hawai'i.

O'Hare, C. R., L. Kalima, and P. H. Rosendahl. 1993. *Inventory and Evaluation of Properties with Potential Historic Significance at Schofield Barracks Military Reservation, O'ahu, Land of Wai'anae Uka, Wahiawa District Island of O'ahu.* Paul H. Rosendahl, Inc., Hilo, Hawai'i.

Pacific Cooperative Studies Unit, University of Hawaii. 2001. *Annual Report - Cultural Resource Management of Army Sub-installations at U.S. Army Garrison, Hawaii.*

Robins, Jennifer J., and Robert L. Spear. 2002a. *Cultural Resources Inventory Survey and Limited Testing Phase I, of the Schofield Barracks Training Areas for the Preparation of a Cultural Resource Management Plan for US Army Training Ranges and Areas, O'ahu Island, Hawai'i (TMK 7-6-01 and 7-7-01)*. Prepared for US Army Corps of Engineers, Honolulu District, Fort Shafter, Hawai'i. Scientific Consultant Services/Cultural Resource Management Services, Honolulu, Hawai'i.

Robins, Jennifer J., and Robert L. Spear. 2002b. *Cultural Resources Inventory Survey and Limited Testing, Phase II, of the US Army Schofield Barracks Training Areas for the US Army Garrison Hawai'i Ecosystem Management Program, Island of O'ahu, Hawai'i.* Prepared for US Army Corps of Engineers, Honolulu District, Fort Shafter, Hawai'i. Scientific Consultant Services/Cultural Resource Management Services, Honolulu, Hawai'i.

State of Hawaii, Department of Business, Economic Development and Tourism. 2001. *The State of Hawaii Data Book*.

State of Hawaii, Department of Health, Clean Air Branch, Hawaii Administrative Rules, Chapter 11-60.1, Subchapter 3, Open Burning.

SRP (Social Research Pacific). 2003. *Oral Historic Studies for the Determination of Traditional Cultural Places at the US Army Schofield Barracks Military Reservation, Wahiawa, O'ahu*

Island, Hawai'i. Draft report prepared for United States Army Engineering District, Honolulu. Social Research Pacific, Inc., Kailua, Hawai'i.

Tomonari-Tuggle, Myra J. 1997. [draft] *Upland Settlement, Leilehua Ranch, and the Military: An Assessment of the Archaeology of the Schofield Barracks Cantonment*. Prepared for Belt Collins Hawai'i, Honolulu. International Archaeological Research Institute, Inc., Honolulu, Hawai'i.

Tomonari-Tuggle, Myra J. 2002. *The US Army in Hawai'i: An Historic Context for Cultural Resources on US Army Garrison, Hawai'i Installations*. Ms., prepared for CEMML and US Army Garrison, Hawai'i. International Archaeological Research Institute, Inc., Honolulu, Hawai'i.

Tomonari-Tuggle, Myra J., and Katherine S. Bouthillier. 1994. *Archaeology and History on the Central O'ahu Plateau: A Cultural Resources Assessment of Wheeler Army Airfield*. Prepared for Belt Collins & Associates, Honolulu, Hawai'i. International Archaeological Research Institute, Inc., Honolulu with Spencer Mason Architects.

U.S. Army Corps of Engineers, Honolulu District. 2002. *Environmental Assessment for a Prescribed Burn at Makua Military Reservation, Island of Oahu.*

U.S. Army Engineering Support Center (USACE) and Nakata Planning Group.2000. *Range and Training Land Program (RTLP) Development Plan, U.S. Army, Hawaii and 25th Infantry Division.*

United States Soil Conservation Service. 1972. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.* Washington, DC

APPENDIX A

COMPLIANCE REQUIREMENTS

Appendix A

Compliance Requirements

Legislation, Executive Orders, and Regulations that either are or could be relevant to this Environmental Assessment are listed below.

Federal Laws
Clean Air Act (as amended through 1990)
Clean Water Act of 1978 (33 USC 1251-1376)
Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 USC 9601-9675)
Endangered Species Act of 1973 (PL 95-632, as amended)
Fish and Wildlife Coordination Act (PL 85-624)
National Environmental Policy Act of 1969 (as amended, PL 91-190; 42 USC 4321 et seq.)
National Historic Preservation Act of 1966 (as amended, PL 89-665; 16 USC 470 et seq.)
Noise Control Act of 1972 (PL 92-574; 42 USC 4905)
Resource Conservation and Recovery Act (42 USC 6901-6992, as amended)

Federal Regulations
Endangered and Threatened Wildlife and Plants (Title 50, CFR, part 17)
Environmental Protection and Enhancement (Title 32, CFR , Part 650)
Environmental Analysis of Army Actions; Final Rule (32, CFR, Part 651)
Protection of Archaeological Resources (Title 32, CFR, Part 229)
Protection of Historic and Cultural Properties (Title 36, CFR, Part 800)
Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (Title 40, CFR, Parts 1500-1508)

Executive Orders
Executive Order 11593, Protection and Enhancement of the Cultural Environment
Executive Order 12898, Environmental Justice
Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks

Department of Defense (DoD) Directives/Instructions
DoD Directive 4700.4, Natural Resources Management Program
DoD Directive 4710.1, Archaeological and Historic Resources Management
DoD Instruction 4715.3, Environmental Conservation Program
DoD Instruction 4715.9, Environmental Planning and Analysis
DoD Instruction 5000.13, Natural Resources
DoD Directive 6050.1, Environmental Effects in the United States of DoD Actions

Army Regulations (AR)
AR 200-1, Environmental Protection and Enhancement

AR 200-2, Environmental Effects of Army Action (NEPA)
AR 200-3, Natural Resources, Land, Forest, and Wildlife Management
AR 200-4, Cultural Resources Management
AR 350-4, Integrated Training Area Management

25th ID (L) and USARHAW Regulations
25th ID (L) & USARHAW Regulation No. 210-6, Ranges and Training Areas

APPENDIX B

AERIAL VALIDATION PLAN FOR HERBICIDE APPLICATION FOR SBCT PRESCRIBED BURN

AERIAL VALIDATION PLAN FOR HERBICIDE APPLICATION FOR SBCT PRESCRIBED BURN

Activity Preparing Request: Installation Fire & Safety Office, U.S. Army Garrison Hawaii, Department of the Army.

Preparation Date: 13 March 2003, edited 28 March 2003

Preparer: Robin Yamamoto, Entomologist, Installation Pest Management Coordinator, Environmental Division, Directorate of Public Works, U.S. Army Garrison, Hawaii.

Purpose: Execution of this herbicide treatment plan is necessary to augment the prescribed burn plan required by the Army to prepare for construction of the proposed Multipurpose Combined Arms Live Fire Range Complex and Qualification Ranges for SBCT. The SBCT Prescribed Burn Plan is attached.

The objective of this plan is to dry vegetation to the degree that a complete burn will result, allowing the prescribed fire objectives to be met (paragraph 2 of the SBCT Prescribed Burn Plan).

If herbicide application is not done prior to the burn, an incomplete burn may result, and the objectives of the burn plan may not be met.

Because the proposed burn area is within an impact area, herbicide application can only be done by aerial application.

Pests Identified: The primary targets are Guinea Grass, *Panicum maximum,* 4-6 feet tall, Haole Koa, *Leucaena leucocephalal,* 4-6 feet tall, Molasses Grass, 2.5 feet tall, and Christmas Berry, *Schinus*, 8-10 feet tall.

Surveillance: Areas requiring herbicide are not accessible by ground application due to potential of life threat to personnel from UXO in the designated burn areas. Pre and post surveillance procedures are predicated on known impact areas where access is prohibited.

Target Area Description: The area proposed for treatment is located in the designated impact area of the Schofield Barracks Military Reservation (SBMR), West Range, north of Kolekole Road and within the Schofield Firebreak Road (see map).

A total of approximately 1500 acres may be treated in the designated impact area of the Schofield Barracks (West Range) and within the Schofield firebreak road network.

Proximity to Inhabited Areas: Military Family Housing units located approximately 750-meters east of treatment area.

Affected Natural Resources: There are no endangered species, wildlife communities, agriculture, livestock areas, etc., in the treatment area. Higher elevation forests immediately upslope and to the west of the target area contain several endangered plant species, and the elepaio (an endangered bird) and portions of its critical habitat. Other forested areas further to the south include parts of The Nature Conservancy of Hawaii's Honouliuli Preserve and also contain endangered plants and the elepaio. Drift to these surrounding areas will be controlled by adding a drift retardant (Airex DC at 0.75%) to the spray, and by applying only when wind speeds are below threshold limits, and by limiting the height at which the application is done.

Affected Area Water Resources: There are no areas where surface water is present. Drainage gullies are present. If heavy rains occur prior to application, it will be postponed until there is complete drainage.

Drift Affecting Natural Resources: Application will only occur when wind speeds are between 2-10 mph and no precipitation. According to the label for Roundup Pro, drift potential is lowest when wind speeds are between 2-10 mph. The label also states that application should be avoided below 2 mph due to variable winds and high inversion potential. The Army will cease all application operations if conditions exceed the above parameters. Also, the Army will cease all application operations if it is observed that there is risk of drift affecting elepaio Critical Habitat or areas occupied by threatened and endangered species (see attached map).

Pesticide Information: The herbicide to be used is Roundup Pro (41% glyphosate), NSN: 6840-01-108-9578, EPA Registration Number: 524-475.

The material is to be applied at a rate of 3 quarts/acre (20 gallons of 3.75% solution per acre). Total amount of product for 1500 acres is 1125 gallons of Roundup Pro concentrate.

The attached MSDS describes toxicity, stability and degradation characteristics.

The main restrictions on the use of the product are to avoid areas where surface water is present and not to mix store or apply the product or spray solutions in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

Application Information: Application of the material will be done by contract using Murray Ag Inc., License No. 10668311. The applicator will be Mr. Ronald Goins, State of Hawaii Pesticide Applicator Certification No. B50583, category 11, expiration date May 03.

Application will be done utilizing a Jet Ranger helicopter at airspeeds of approximately 70 mph. Application will be done at a height not greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. The spray swath will be approximately 40 feet.

Spraying is scheduled to begin 17 May 03 and to continue until 24 May 03, if necessary, to complete the one time application.

Alternative Control Methods: As an alternative, the range may be burned without the use of an herbicide; however, as discussed previously, an incomplete burn may result and the objectives of the burn plan may not be met.

Sensitive Areas: There are no protected species habitats, crop lands, lakes, rivers, running streams, etc., in the treatment area.

Agency Coordination: NEPA documentation, and consultation with State of Hawaii Department of Agriculture and USFWS, will be done prior to treatment.

Environmental Documentation: This Aerial Validation Plan will be included in the Environmental Assessment for the SBCT Prescribed Burn Plan.

APPENDIX C

SBCT PRESCRIBED BURN PLAN
SB 03-01
SBCT UXO CLEARANCE AND
CULTURAL SURVEY
SCHOFIELD BARRACKS (WEST RANGE)

FINAL DRAFT

SBCT PRESCRIBED BURN PLAN
SB 03-01

SBCT UXO CLEARANCE AND CULTURAL SURVEY
SCHOFIELD BARRACKS (West Range)

Installation Fire & Safety Office
U.S. Army Garrison Hawaii

RESPONSIBLE INDIVIDUALS

PLAN APPROVAL: SAMMY HOUSEBERG _____
TITLE: Director for Installation Fire & Safety

PLAN EXECUTION: GAYLAND ENRIQUES _____
TITLE: Deputy Fire Chief/Wildland Fire Program Manager

Prepared by: _____ Date: _____
Installation Fire & Safety

Reviewed by: _____ Date: _____
DPW, Environmental

Reviewed by: _____ Date: _____
G3/DPTM, Range Division

Reviewed by: _____ Date: _____
Federal Fire Department

Reviewed by: _____ Date: _____
U.S. Fish & Wildlife Service

Reviewed by: _____ Date: _____
Army Staff Judge Advocate

Approved by: _____ Date: _____
Commander, US Army Garrison Hawaii

SBCT PRESCRIBED BURN PLAN
SB 03-01

1. **PROJECT LOCATION:**

Burn Unit is located in the designated impact area of the Schofield Barracks Military Reservation (SBMR), West Range, north of Kolekole Road and within the Schofield Firebreak Road.

2. **PRESCRIBED FIRE OBJECTIVES**:

- Reduce fuel loads subject to potential wildfires started by military training activities
- Enhance ground visibility essential to conduct UXO surface clearance by EOD
- Eliminate 80-90% of the volatile grasses, duff, ground litter, and brush in the burn unit
- Expose "spent" ordnance in order for EOD unit to identify, remove, or detonate in place, thus reducing the accumulation of ordnance in the impact area
- Provide excellent ground visibility essential prior to conducting required cultural surveys
- Increase allowable unit training maneuver area for proposed SBCT and Battle Area Complex

3. **RESOURCE MANAGEMENT OBJECTIVES:**

- Reduce fuel load in portions of SBMR subject to risk of potential wildfires
- Eliminate 90% of grass fuels
- Eliminate 50% of woody fuels <1 inch in diameter
- Reduce duff and ground litter to <20%

4. **DESIRED EFFECTS AND TOLERABLE DEVIATIONS:**

- Eliminate 70-90% of fuels <1 inch in diameter
- Reduce duff and ground litter 70-90%

TOLERABLE DEVIATIONS:

Scorching of residual trees located within the burn units cannot be mitigated. A maximum 8 feet of scorch is expected in the lower limbs of residual trees. Some minor crowning is anticipated and cannot be avoided. Wildfires outside of the designated prescribed burn area are beyond tolerance limits.

5. **POST BURN EVALUATION RESPONSIBILITIES:**

Prescribed Fire Manager and Burn Boss to evaluate fuels consumption. Senior Federal Fire Department Officer to evaluate operational and tactical methods of control and mop up activities as required. Prior to any entry into burn area, EOD OIC and Installation Safety Officer shall evaluate success of burn and exposure of any ordnance for potential detonation and/or removal.

6. **PROJECT AREA DESCRIPTION:**

A total of approximately 1200-1500 acres may be burned in the designated impact area of the Schofield Barracks (West Range) and within the Schofield firebreak road network. Project burn will be treated as three separate and distinct prescribed burn units within this plan. Burn Unit 1 is located in the southwest section of the SB impact area. Burn Unit 2 is located in the central and northeast section of the SB impact area. Burn Unit 3 is located in the south central section of the SB impact area. The entire proposed burn areas are completely circumscribed by the Schofield Fire Break and existing range road network. Execution of this prescribed burn plan is required by the Army in preparation for construction of the proposed Multipurpose Combined Arms Live Fire Range Complex and Qualification Ranges for SBCT.

SBCT PRESCRIBED BURN PLAN
SB 03-01

A. UNIT DESCRIPTORS	Unit 1	Unit 2	Unit 3
(1) Total Burn Area Size:	200	400	600
(2) Total Burn Area Perimeter (Chains):			
(3) Complexity:	III	III	III
(4) Elevation (Top/Bottom):	1360/	1270/	1270/
(5) Position on Slope:	Mid-Slope	Mid-Slope	Bottom
(6) Aspect:	East	East	East
(7) Slope Percentage:	10-15%	10-15%	0-5%
(8) County	Honolulu	Honolulu	Honolulu

B. FUEL DESCRIPTION:

(1) Vegetation Type:	Guinea Grass, *Panicum maximum,* 4-6 feet tall Haole Koa, *Leucaena leucocephalal,* 4-6 feet tall Molasses Grass, 2.5 feet tall Christmas Berry, *Schinus,* 8-10 feet tall
(2) NFFL Fuel Model:	Modified 3, Custom Guinea Grass Model
(3) Total Fuel Loading (Ton/Acre):	9.42 tons/acre in unmanaged areas
(4) Surface Fuel Depth:	2-4 feet
(5) Duff Depth (Inches):	1-2 inches
(6) Fuel Characteristics:	Non-Native Grass and scattered shrubs
(7) Arrangement (Inside):	Standing Live/Dead Guinea Grass, Haole Koa, and Molasses Grass
(8) Arrangement (Outside):	Standing Live/Dead Guinea Grass, Haole Koa, Molasses Grass, and Christmas Berry shrubs
(9) Continuity (Inside):	Horizontal continuity separated by *Schinus* in waterway drainage areas.
(10) Continuity (Outside):	Horizontal continuity broken by surrounding access roadway and mowed guinea grass areas.

7. FIRE PRESCRIPTION:

A. ACCEPTABLE RANGE OF FIRE BEHAVIOR:

All fires will be confined within the existing Schofield firebreak roads and north of Kolekole Avenue. Fires will not be allowed to spread outside the designated burn unit(s). Backing fires will control flame length.

B. ACCEPTABLE LIMITS OF ENVIRONMENTAL ELEMENTS (Quantitative Rx Window)

	*HOT (Dry)	Desired Range	*COOL (Wet)
(1) Dry Bulb Temperature (F)	85	70 to 85	65
(2) Relative Humidity (%)	40	50 to 70	80
(3) 1 Hour Time Lag (%)	5	7-20	30
(4) 10 Hour Time Lag (%)	7	10-25	30
(5) 100 Hour Time Lag (%)	N/A		
(6) 1000 Hour Time Lag (%)	N/A		
(7) Live Fuel Moisture Content Range	30	50-250	300
(8) Mid-Flame Wind Speed	15	7-10	0

C. TEST BURN REQUIRED? Yes

(1) Firing Techniques and General Sequence: PREMO Mark III Aerial Ignition Device (AID) with a private civilian helicopter to disperse ignition materials. Combination of strip firing and perimeter firing methods. May use drip torches and hand flares along established roadways or mosaic of unburned areas to complement AID.

(2) Test Fire Objective: Observe fuel consumption, fire behavior, and smoke dispersal.

8. SMOKE MANAGEMENT:

A. Smoke Sensitive Area: Potential impact to Military Family Housing units located approximately 750-meters east of Burn Unit 3.

B. Dispersal Specifications:

(1) Wind Direction:

	Desired	Acceptable
Burn Site:	E, NE	Any
At Venting Height:	E, NE	Any
During Burnout:	E, NE	Any

(2) Desired Venting Height (Feet above MSL): 2000 feet+

C. APCD/AQMD Information:

(1) District:	Oahu
(2) Emission Limitations:	None
(3) Burn Day Information:	SB/MicroRAWS, WX belt kit, Nat'l Weather Service
(4) Variance Procedure:	Notify DPW Environmental Office prior to burning

9. WEATHER:

DATA COLLECTION:

(1) Weather measurements will be taken every hour, on the hour, by the nearest RAWS station and every 15 minutes with belt weather kit at the burn site.
(2) Weather data to be collected:
-Wind Speed
-Wind Direction
-Wet/Dry Bulb Temperature
-Relative Humidity
(3) The 10-hour fuel moisture will be taken from the SBMR RAWS station every hour.
(4) The burning index (BI) will be noted during the burn period.
(5) Sampling period: 1 week prior to ignition and immediately prior to first firing cycle.

FORECASTS: National Weather Service spot forecast the day of and 48 hours prior to the burn. No precipitation in the last 24 hours and none forecasted, no strong winds predicted in the forecast period.

10. PUBLIC INFORMATION:

	CONTACT	WHEN	HOW	RESPONSIBLE
A.	US Fish & Wildlife Service	ASAP	In Writing	DPW Environmental
B.	Federal Fire Dept	"	"	IFSO
C.	Public Affairs Office	"	"	IFSO
E.	Division of Forestry & Wildlife	"	"	IFSO
F.	Honolulu Fire Dept	"	"	IFSO

11. ORGANIZATION AND COMMUNICATIONS PLAN:

A. ORGANIZATION (See Appendix A)

1. Prescribed Fire Manager: Mr. Sammy Houseberg
2. Burn Boss: Mr. Gayland Enriques
3. Safety Officer: Mr. Dennis Hoke
4. Lighting Boss: Mr. Gayland Enriques
5. Holding Boss: Mr. Warren Hahlbeck
6. Mop-Up Boss: Federal Fire Captain
7. Patrol: Mr. Tom Husemann
8. Aviation OIC: 2-25 Aviation Pilot-In-Command (PIC)

B. COMMUNICATION

1. Radio Frequency: (FM) 38.30 Range Control
   (VHF) 123.100 Air-To-Ground
   (VHF) 138.00 Federal Fire Dept
2. One (1) Portable Radio for each Boss
3. One (1) Portable Radio for each Lighter
4. Three (3) Air-To-Ground Radios

Note: Range Control will make proper notification to appropriate agencies prior to ignition, fire escape or potential problems, and provide status report at the end of each day.

12. LINE CONSTRUCTION/PRE-TREATMENT:

A. LINE CONSTRUCTION:

(1) The South Firebreak Road network and Kolekole Avenue will serve as the primary containment line. The Schofield Firebreak Road and interior roads of the ranges will be improved so that it provides a minimum 15-20 feet wide fuel free roadway and sufficient access for wildland fire vehicles.
(2) Roadways will serve as anchor points for holding crews to prevent fire escape.

B. PRE-TREATMENT:

(1) Aerial broadcast spraying of herbicide treatment (roundup) by helicopter shall be applied to reduce live vegetation prior to use of prescription fire. Herbicide will be applied no later than two weeks prior to scheduled burn. (Refer to Attachment- Aerial Herbicide Validation Plan)

13. FIRE TEAMS AND MOP-UP PLAN:

A. FIRE TEAM INSTRUCTIONS (By Priority)

1. Keep fires within designated perimeter of each burn unit.
2. Take immediate action on all spot fires or slopovers.
3. Inform Lighting and Burn Boss of deviant weather or fire behavior activity observed.

B. MOP-UP TEAM INSTRUCTIONS (By Priority)

1. Any burning material will be moved well into the black area (10-20 feet).
2. Mop-up needs will be determined by the Prescribed Fire Manager/Burn Boss and be dependent upon existing potential for escape.

C. PATROL FORCE INSTRUCTIONS (By Priority)

1. Actively patrol burn perimeter until declared out or until significant precipitation is occurring.
2. Ensure fire stays within the firebreak roads and out of desired exclusion areas.

14. IGNITION PROTOCOL:

A. Upon completion of test burn and when weather conditions are favorable for each burn, ignition will occur using multiple strip firing techniques ignited by use of plastic spheres dispensed from Aerial Ignition Device (AID) from a helicopter.

B. Timely sequence firing methods will continue from the helicopter AID anchoring off roadways, waterway drainages, or managed grass areas. Perimeter backfiring from access roads using drip torches may be used to complement AID where unburned mosaic of vegetation exists.

15. HOLDING PLAN AND EQUIPMENT:

A. EQUIPMENT NEEDS:

(1) Two (2) HMMWV's equipped with pumps and foam proportioners.
(2) Two (2) Brush Engines for patrol.
(3) Two (2) water tankers with minimum 1000-gallon capacity
(4) One (1) helicopter dedicated for PREMO Mark III Aerial Ignition Device
(5) Two (2) UH-60 helicopters on site equipped with fire bucket and Sacksafoam II or III
(6) One (1) CH-47 helicopter on standby at Wheeler Army Airfield, with 30-minute leash
(7) Two (2) portable flexible water tanks (3000-gal capacity)
(8) Two (2) reserve fire buckets
(9) Ten (10) handheld radios
(10) Hand tools and water backpacks for twenty (20) firefighters

B. PERSONNEL PLACEMENT: To be determined by Prescribed Fire Manager and Burn Boss.

C. WATER: (Sources, Pump locations, Hoselays, etc.):

No pre-laid hose lay unless needed. Engines and water tankers to remain mobile as possible. Portable flexible dip tanks will be filled on site to full capacity prior to firing in support of helicopter fire bucket operations. Helicopters will obtain water from approved water reservoirs (e.g., Helemano Reservoir, Opaeula Reservoir, etc.).

D. LINE CONSTRUCTION: Line construction (access roads) will be completed and checked prior to burning.

E. NARRATIVE:

Holding crews and two (2) HMMWV's will be pre-positioned on the Firebreak Roads to watch for and perform quick attack on any slopovers that occur. The water tanker will provide water re-supply to HMMWV's and brush engines. Lookouts and safety zones will be determined by the Holding Boss.

After the fire is declared out, a crew will remain in the area for a cool down period before being released at the discretion of the Patrol Boss.

16. FIRE CONTINGENCY PLAN WILDLAND FIRE:

A. ESCAPE NOTIFICATION PROCEDURES AND CONCERNS:

(1) Once a fire escapes the South Firebreak Road or Kolekole Avenue, it will be considered as a wildfire and firing methods will cease until after the escaped fire is under control.

(2) The Prescribed Fire Manager will immediately implement the contingency plan and notification procedures. All available assets will respond to assist fire crews to suppress the wildfire. Helicopters with fire buckets will be utilized in all fire suppression activities.

(3) The onsite UH-60 Helicopter(s) at Dragon X will immediately respond as part of the initial attack. The CH-47 on 30 minute standby at Wheeler AAF and will respond when requested by the Prescribed Fire Manager. The approved water reservoirs will serve as primary water source for all military helicopters.

17. RISK ASSESSMENT:

A. POTENTIAL:

(1) Wildland Fire:

The designated burn area has a low to moderate potential for fire escape. The low potential of fire escape is based on surrounding firebreak roads, interior roadways, and fuel reduction in the form of vegetation control through mowing. The highest potential for escape is near the slope of Pu'u Pane Ridge. Unpredicted gusts of wind may provide potential for spotting outside the burn unit. Wind shifts and eddying may cause for some concern and may alter the order in where the firing sequence begins.

(2) Smoke Intrusion:

Low potential for affecting any major population. It may be expected that the controlled burns will produce significant smoke within Schofield Area X and military family housing units. Signage will be posted on Beaver Road and Kolekole Avenue to increase public awareness and traffic safety.

B. CONSEQUENCES:

(1) Wildland Fire:

Fire escape outside of the firebreak road will involve an area of unmanaged fuels and forested area. Fire suppression crews will have limited access to conduct firefighting actions but will be supported by aerial fire bucket drops by helicopters. The area is located outside the Schofield Firebreak Road. The closest listed species of threatened and endangered plants known are located approximately 1500 feet northwest of the designated burn area.

(2) Smoke Intrusion:

Consequences by smoke will be minimal based on fuel loads and the total area expected to be burned. There is potential for obscure visibility for motorists traveling on Kolekole Avenue. Traffic control will be initiated should conditions warrant such action.

18. SAFETY PLAN:

A. All personnel involved in the prescribed burning will be equipped with Personal Protective Equipment (PPE) to include Nomex fire shirts, pants, leather boots, helmet, and eye protection. Fire shelters, hand tools, 5-Gallon backpacks, and radio communications shall also be issued. All personnel are military or DA civilians and are in excellent physical condition. This prescribed burn is to be conducted with forecasted predominant trade winds and should not present a problem. If the wind shifts for any length of time, firing sequence will be altered and fire behavior observed. Prior to ignition, all personnel will be briefed on escape routes, safety zones, medical emergencies, traffic control, chain-of-command, use of equipment, individual responsibilities, and actions in the event of escape fire.

B. Although some of burn areas have been surface cleared by EOD in the past, there is a possibility of unexploded small arms munitions. Precautions must be taken to avoid areas where "popping" has been heard. Personnel will move at least 15 feet away from small arms munitions that are being detonated into a safe area. Established roadway and surrounding mowed fuelbreak areas will provide minimum safety distances and serve as refuge area, an anchor point, and control line for all personnel.

C. The burn area fuel load consists of low to medium height grass in most areas. All areas inside the firebreak road network are considered acceptable and manageable for the prescribed burn.

D. A Safety Officer from the Installation Safety Office will be assigned to the Prescribed Burn and is responsible for monitoring and assessing hazardous and unsafe situations and developing measures for assuring personnel safety. The Safety Officer will correct unsafe acts or conditions through the regular line of authority, although any individual directly involved in the prescribed burn may exercise emergency authority, to stop or prevent unsafe acts when immediate action is required.

E. Safety Equipment (See Appendix A)

F. Duties and Responsibilities (See Appendix B)

G. Escaped Fire Situation Analysis (See Appendix C)

H. Organizational Chart (See Appendix D)

I. Aviation Safety and Ops Plan/ PSD Checklist (See Appendix E)

19. GO/NO-GO CHECKLIST:

NOTE: A "NO" RESPONSE TO ANY ITEM MEANS STOP!

	YES	NO
1. Are all fire prescribed specification met?	___	___
2. Are all smoke management prescription specification met?	___	___
3. Is the fire weather forecast favorable?	___	___
4. Have all air quality regulations been met?	___	___
5. Are all personnel required in the Burn Plan on site?	___	___
6. Have all personnel been briefed on the ignition test plan objectives and requirements?	___	___
7. Have all personnel been briefed on safety hazards, escape routes and safety zones?	___	___
8. Is all of the required equipment in place and in working order?	___	___
9. Are available resources (including back-up) adequate for containment of escapes under local and adverse conditions?	___	___
10. Are all answers to all of the above questions "YES"?	___	___
11. In your opinion, can the test be executed according to the plan and will it meet the planned objectives?	___	___

If all 11 questions above have been answered "YES" then you may proceed with firing.

Date _____ Time _____ By _____

20. POST BURN SUMMARY AND DOCUMENTATION:

Date Burned: _____ Time of Day: _____

Days Since Rain: _____ Season Precipitation to Date: _____ inches

Actual Weather: Temp: _____F RH: _____% WS/WD: _____ NFDR-BI: _____

Fuel Moistures: 1 HR: _____ 10 HR: _____ 100 HR: _____ 1000 HR: _____

Brush: _____% Herbaceous: _____%

Fire Behavior: ROS: _____ Ch/Hr Average Flame Length: _____ft Height: _____ft

Scorch Height: _____ft Bole: _____ft Crown: _____ft

TEST BURN RESULTS NARRATIVE:

BURN EVALUATION: (Discuss Objectives, Results, etc>)

Prepared By: _____ Date: _____

Reviewed By: _____ Date: _____

APPENDIX A

SAFETY EQUIPMENT:

MANDATORY PERSONNEL PROTECTIVE EQUIPMENT (PPE) – Initial Attack

1. Hard Hat or Helmet with chin strap
2. Leather or Cotton Gloves with leather face
3. Safety Goggles
4. Nomex Brush Shirts, Pants, or Jumpsuit (Flame Resistant)
5. Portable Back-packs (5-gallon Indian or Nylon Duck type)
6. Water canteen or bottles
7. First Aid Kits
8. Nomex Hood
9. Sunscreen (Personal Option)
10. 8” Leather Boots, No Steel Toe
11. Fire Shelter

APPENDIX B

ORGANIZATION AND DUTIES/RESPONSIBILITIES:

1. ORGANIZATION. A Burning Boss, experienced with local weather, fire behavior, fuels, and terrain conditions shall personally supervise the burning operations on each management ignited prescribed fire. More complex burns may require Lighting Boss and a Holding Boss. A Prescribed Fire Manager qualified to manage prescribed fires shall personally supervise the operations.

2. Every management ignited prescribed fire requires the performance of the duties described in this appendix. On smaller or less complex projects, one person may perform all the required duties. Larger or more complex projects will require more qualified people to perform necessary duties. The organization required varies with the size and complexity of each prescribed fire burn.

3. This prescribed fire requires the performance of the duties shown in this appendix. The Prescribed Fire Manager will determine through the development of the Prescribed Fire Burn Plan, the organization, expertise, and positions necessary to manage the prescribed fire.

4. PRESCRIBED FIRE MANAGER:

    a. Is responsible for the development in response to appropriate management direction, the prescribed Fire Burn Plan for each management ignited prescribed fire.
    b. Coordination and scheduling the ignition and management of two or more management ignited prescribed fires, or the management of a single prescribed fire.
    c. Development and implementation of the Prescribed Fire Burn Plans.
    d. Coordinating personnel and equipment requirements, including resources called for in the holding actions and contingency actions section of the burn plan.
    e. Ensuring appropriate public notice is given prior to and during the prescribed fire activity.
    f. Coordinating prescribed burn projects to avoid exceeding holding and contingency capabilities.
    g. Monitoring prescribed burn projects to ensure that all plan requirements are being met.
    h. Recording and reporting costs and accomplishments and recommending improvements to the approving line officer.
    i. Ensuring that the prescribed fire burn does not exceed prescription.

5. BURNING BOSS:

    The Burning Boss has direct responsibility for onsite implementation of specific actions in strict compliance with the approved Prescribed Burn Plan. The Burning Boss is accountable to the Prescribed Fire Manager. The Burning Boss has the following responsibilities that cannot be re-delegated:

    a. To make the decision to proceed, accelerate, defer, or curtail operations based on attainment of the approved prescription criteria or lack thereof, including daily validation of prescribed criteria on multi-day projects.
    b. To certify that the fire is out.
    c. Ensure safety of all personnel.
    d. Supervise all operations on the project site.
    e. Ensure that fire prescription is met before proceeding with ignition.

ORGANIZATION AND DUTIES/RESPONSIBILITIES:

f. Ensure that the forecast and onsite weather parameters are within prescription at the time of ignition and predicted to remain so during the expected life of the burn.
g. Ensure that all Prescribed Fire Burn Plan requirements are met and that personnel are briefed before proceeding with ignition.
h. Control directly, or through supervision of Lighting Bosses, the method, rate, and location of firing.
i. Monitor the fire's behavior and terminate operations if fire behavior or effects are not according to prescription.
j. Ensure the availability of suppression resources in the event the prescribed fire escapes and is declared a wildfire.
k. Accomplish mop-up to pre-determined standards in accordance with the Prescribed Fire Burn Plan.
l. Maintain immediate and clear communications with the Lighting Boss and Holding Boss at all times.

6. LIGHTING BOSS:

The Lighting Boss reports to the Burning Boss. The Lighting Boss shall:

a. Maintain control of the ignition sources, including aerial ignition, on the burn project at all times.
b. Ensure the deployment, sequence, and timing of all ignition sources to meet project objectives.
c. Supervise assigned personnel and ensure their safety.
d. Maintain immediate and clear communications with the Burning Boss and Holding Boss at all times.
e. If aerial ignition is used, ensure that the aerial ignition pilot is briefed on the Job Safety and Health Hazard Analysis, with emphasis on aerial flight hazards.

7. HOLDING BOSS:

The Holding Boss reports to the Burning Boss on management ignited prescribed fires. On prescribed natural fires the Holding Boss may report directly to the Prescribed Fire Manager. The Holding Boss shall:

a. Confine the prescribed fire within the planned area.
b. Take action when fire exceeds, or has the potential to exceed, the planned area.
c. Confer with the Lighting Boss, Burning Boss, or Prescribed Fire Manager, as appropriate, to match holding and contingency capability with firing sequence.
d. Supervise assigned personnel and ensure their safety.
e. Maintain immediate and clear communications with the Burning Boss, Lighting Boss, or Prescribed Fire Manager, as appropriate at all times.

8. SAFETY OFFICER:

The Safety Officer has overall responsibility for monitoring and assessing hazardous and unsafe situations and developing measures for assuring personnel safety. The Safety Officer will correct unsafe acts or conditions through the regular line of authority. The Safety Officer has the authority to stop or prevent unsafe acts when immediate action is required.

APPENDIX C

ESCAPED FIRE SITUATION ANALYSIS (EFSA)

Fire Management Area: Schofield Barracks (West Range), Oahu

Location: The Schofield Barracks (West Range) is located centrally on the Island of Oahu. The Waianae mountains lie to the west and the township of Wahiawa lies approximately two miles to the east.

Fire Name: SBCT Prescribed Burn, SB 03-01, Schofield Barracks (West Range)

Fire Grid Coordinates: EJ945790

Date: June 2003

Land Status: The area consists of 4,522 acres of which 3,460 acres are Ceded and 882 acres are Fee Simple.

Adjacent Landowners: U.S. Navy, State of Hawai'i Department of Land & Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW), Dole Food Corporation, Del Monte Food Corporation, The Nature Conservancy of Hawai'i, Wahiawa Township, and various private landowners in the area adjacent to the town of Wahiawa.

Fire Management Option(s): Full Protection Management Option. All fires in these designated areas will receive aggressive suppression efforts until the fire is declared out. This option is designed for the protection of high natural resource value areas, and cultural and historical sites found within or adjacent the fire management area.

This information is used as a pre-attack Escaped Fire Situation Analysis (EFSA) to provide guidelines to the Prescribed Burn Manager for the development of a joint EFSA with the Federal Fire Department (FFD), DOFAW, and City & County of Honolulu Fire Department under the Unified Command Situations of the Incident Command System (ICS).

1. EVALUATION CRITERIA (Check those criteria which MUST be met):

		MUST
a. Economic:	Government Facilities	x
	Military Targetry Equipment	
	Road and Trail Network	x
b. Environmental:	Watershed Influences	
	Threatened and Endangered Species	x
	Wildlife Habitat	x
	Soil Protection	
	Natural Forest Reserves	x
c. Social:	Air Quality	
	Shoreline Aesthetics	
	Hunting, Fishing Habitat	
	General Outdoor Recreation (Camping, hiking, etc.)	
	Firefighter and Public Safety	x
	Public Concerns	x
d. Other:	Archaeological and Cultural Resources	x
	Neighboring Lands	x

2. ALTERNATIVES

	A	B	C	D
General Plan Of Control (Strategic)	Full Fire Control Control of all fires fires within burn unit(s)	Contain within Schofield Firebreak Roads	Contain within SBMR installation boundary	Contain to Waianae Range
Specific Plan	Direct Attack of Perimeter	Direct/Indirect Attack of Schofield Firebreak Roads	Indirect Attack of Perimeter Modified Suppression Actions	Indirect Attack of Perimeter Modified Suppression Actions
Probability of Success	97%	90%	75%	50%
Size (Predicted final size in acres)	<50 acres	<400 acres	4500 acres	>5000 acres
Estimated Control Time	<2 hours	4 hours	>12 hours	>24 hours

3. RESOURCES REQUIRED

	Firefighting Resources	Estimated Cost
Alternative A	Range Division, 2/25 Aviation, and 1 FFD Engine	$1-5K
Alternative B	Range Division, 2/25, B-214 Aviation, and FFD	$10-15K
Alternative C	Range Division, 2/25, B-214 Aviation, FFD, Honolulu County Fire Department, DOFAW	>$15K
Alternative D	All Wildland Fire Cooperative Resources	>$50K

4. SELECTED ALTERNATIVE

a. Selected Alternative: A then B then C and then D

b. Justification: (Document the rationale, criteria, value change, available resources, etc., for selection of this alternative).

- Full suppression of wildfire is the order
- Direct attack, going indirect when necessary for firefighter safety to contain smallest as possible size, in the quickest time
- Human values to risk from modified suppression actions
- Unified Command with RDH, FFD, HFD, DOFAW for management of the fire incident
- Pre-Attack Guidelines are in the Wildland Fire Management Plan, dated March 2000
- Potential threat and damage to Threatened & Endangered Species habitat areas
- Native forest will convert to alien dominated savanna and grassland types.

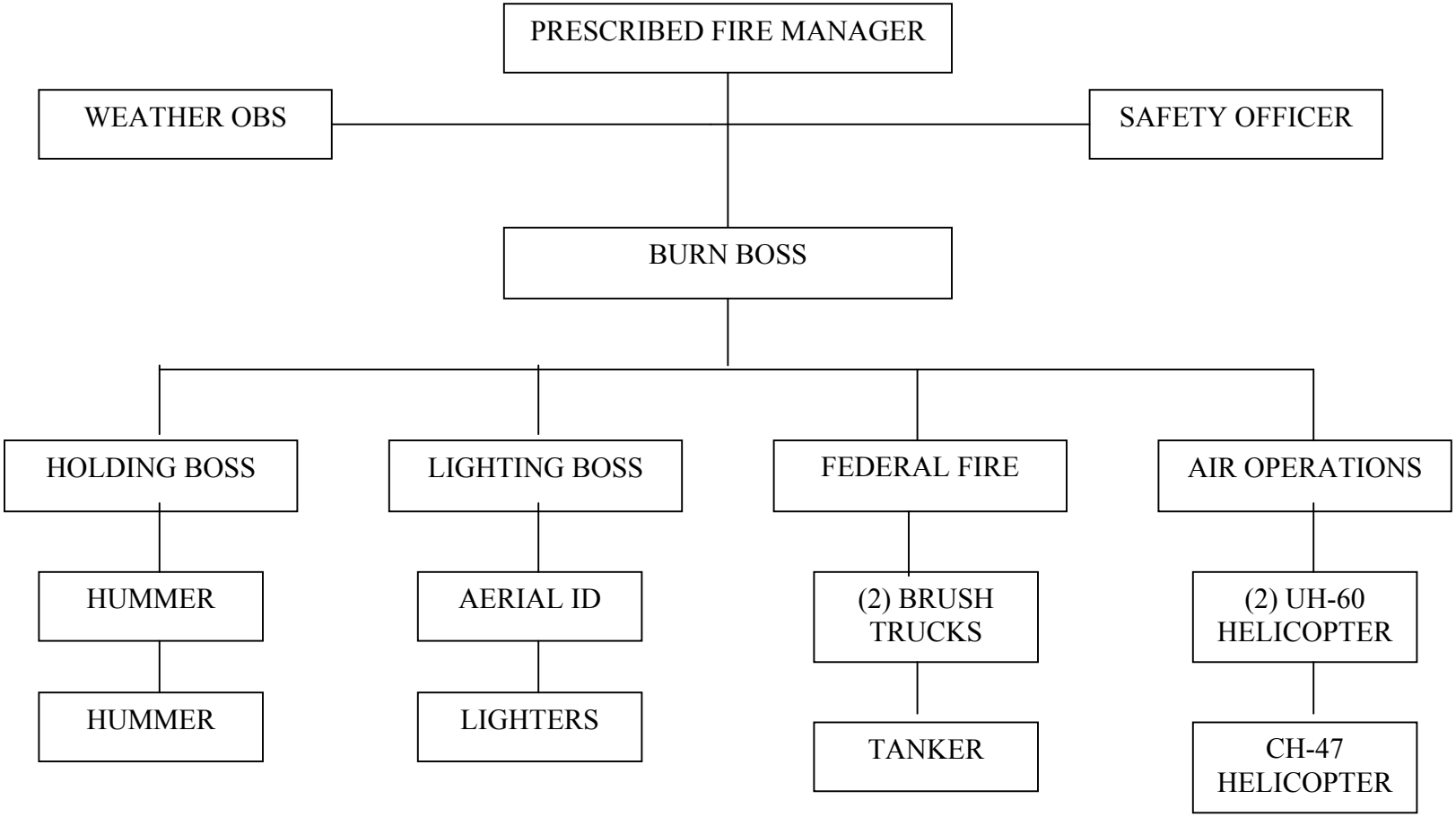
c. Public Information Direction: (Keeping public informed of situation)

- Refer to Army Public Affairs Office (PAO)
- IC will designate Information Officer
- Cooperation with Oahu Civil Defense Center for complex situations

APPENDIX D

ORGANIZATIONAL CHART

SBCT PRESCRIBED BURN PLAN, SB 03-01



APPENDIX E

AVIATION SAFETY & OPERATIONS PLAN
PLASTIC SPHERE DISPENSER (PSD)

A. ORGANIZATION/POSITION RESPONSIBILITIES:

1. PILOT: Pilot will follow lighting plan, under the direction of the Burn Boss/Ignition Specialist. Pilot-in-Command (PIC) is responsible for all matters related to aircraft operations and safety, including installing PSD in helicopter and helicopter load calculations.

2. PSD OPERATOR: Serves as PSD Operation to the Burn Boss/Ignition Specialist. Briefs pilot, identifies safety requirements at the operations briefing, and monitors overall operation. May serve as Helibase/Helispot Manager. The operation is responsible for the preparation, operation, maintenance, and care of the PSD. The operator verifies for Burn Boss/Ignition Specialist that prescribed spacing of ignition is occurring and makes necessary adjustments. Determines if malfunction occurs and acts accordingly. If onboard fire occurs, must determine if fire can be extinguished, or if unit must be jettisoned from the aircraft. The operator will communicate with the pilot and ground personnel on all procedures associated with operation and or emergencies occurring during operation.

3. PARKING TENDER: (Optional)
Directs pilot during landing and take-offs by use of air-to-ground radio. Equipped with boom microphone and headset. Insures that all personnel are clear of safety circle during take-off and landing.

4. HELIBASE/HELISPOT SUPPORT (As needed)

a. Helibase/Helispot Fire Protection: At minimum, one 2-lb fire extinguisher and 5-gals of water will be positioned at the helibase/helispot.
b. Radio Operator: Will be at the helibase/helispot. Will initiate radio communications with Burn Boss and dispatch.

B. HELIBASE BRIEFING:

1. Attendance: Pilot
PSD Operator
Helibase/Helispot Manager
Burn Boss/Ignition Specialist
2. Maps/Photos for pilot: Flight Hazard Map (displayed) and discuss restricted areas.
3. Define roles performed by each person/position.
4. Standard Communication Terminology: Determine both hand and radio communications.
5. Actions to be taken by each individual in the event of mishap. Display and demonstrate crash rescue kit contents and use. Have pilot point out location of main battery switch and fuel supply shut-off.
6. Discuss ignition patterns and firing sequence.
7. Critique previous days operation (if applicable).

APPENDIX E (Cont'd)

AVIATION SAFETY & OPERATIONS PLAN
PLASTIC SPHERE DISPENSER (PSD)

C. EMERGENCY PLAN:

1. EMERGENCIES:
   a. Notify Dispatch
   b. Number of people involved
2. AIRCRAFT ACCIDENT:
   a. Extrication
      (1) Use of crash rescue kit.
      (2) Use care to prevent further injury to aircraft occupants when using these tools.
      (3) Shut off power by moving main battery switch to off position.
      (4) Shut off fuel supply.
      (5) Suspect serious injuries, exercise extreme care when removing occupants.
   b. Fire Suppression
      (1) Utilize foam and/or dry chemical or Halon fire extinguishers.
      (2) Give priority to protecting personnel.
3. FIRE AT MIXING AREA:
   a. Give priority to protecting personnel.
   b. Use fire extinguishers and water.
   c. Shut off machine.
4. RESCUE/FIRE SUPPRESSION CREW:
   a. Helibase/Helispot Manager
   b. PSD Operator
   c. Parking Tender (if assigned)
5. FIRST AID AND TRANSPORT TO MEDICAL FACILITY:
   a. Contact ECC, Burn Boss and/or Prescribed Burn Manager to arrange transportation of injured personnel to nearest medical facility.
   b. After extrication/rescue of personnel administer first aid as needed.

D. AIR OPERATIONS/SAFETY CHECKLIST

1. HELIBASE SAFETY:
   a. Qualified PSD Manager/Operator assigned.
   b. Helibase/Helispot meet established standards.
   c. Organizational chart posted; Radio frequency assignments known.
   d. Helibase/helispot fire protection meets established standards.
   e. Crash rescue/evacuation kits on the helibase/helispot.
   f. Emergency Plan posted.
   g. All personnel briefed, aerial ignition personnel briefed on in flight operations.
   h. Separation of aircraft (if more than one used).
   i. Personal protective equipment meets established standards.

APPENDIX E (Cont'd)

AVIATION SAFETY & OPERATIONS CHECKLIST
PLASTIC SPHERE DISPENSER (PSD)

2. AIRCRAFT PILOT(S):

a. Check pilot and aircraft approval cards.
b. Check pilot and aircraft limitations.
c. Load calculations prepared and posted.
d. Check aircraft radios.
e. Remove all loose articles for each person.
f. Water bucket ordered with aircraft (optional).

3. PLASTIC SPHERE DISPENSER:

a. Installation correct with restraints in place.
b. Mechanical operation satisfactory.
c. Extinguisher (water reservoir) system filled and operational.
d. Glycol reservoir filled and tightly capped.
e. 20 second ignition delay achieved.
f. Intercom and aircraft-to-ground communications operable.
g. Pilot has been briefed and agrees that all is in order.
h. Sphere containers secured.
i. Knife available for emergency use.
j. Additional container of water available.
k. Tool kit/Premo Mark III manual on board aircraft (optional).

4. SUPPORT EQUIPMENT/PERSONNEL:

a. Adequate support equipment/personnel to complete mission.
b. Pump/engine operational checks.
c. Radio/communications operationally checked.
d. Support equipment/personnel prepositioned before actual operations begin.
e. Adequate supply of plastic spheres and glycol to complete project.
f. PSD checklist complete.

The following signatures certify that all of the above checklist items have been accomplished.

_____ Date: _____
PSD Operator

_____ Date: _____
Burn Boss

APPENDIX D

AGENCY CONSULTATION AND COORDINATION

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
File:

March 27, 2003

03-354M&A CAB

Colonel Floyd A. Quintana
Director of Public Works
Department of the Army
Headquarters, United States Army Garrison, Hawaii
Schofield Barracks, Hawaii 96857-5000

Dear Colonel Quintana:

The Department of Health (DOH), Clean Air Branch, received your letter dated March 12, 2003 requesting approval for a prescribed burn at Schofield Barracks West Range on June 7-11, 2003. The purpose of the burn is to reduce the potential for wild fires, improve visibility of the ground, and allow surface clearance of unexploded ordnance.

The DOH grants approval pursuant to Hawaii Administrative Rules, Section 11-60.1-52, Paragraph (b) (3), regarding open burning and fires to abate a fire hazard.

The DOH received a copy of a draft burn plan with notification of the burn. The DOH request that no burning occurs during a no-burn period as provided in section 11-60.1-55. To determine if it's a no-burn day, please call the Fire Department or the Clean Air Branch prior to burning. If you have any questions, please contact Ms. Lisa Young of my staff at 586-4200.

Sincerely,

WILFRED K. NAGAMINE
Manager, Clean Air Branch

LY:rkb

c: Debra Ikeno, Environmental Division, USAG-Hawaii, DPW

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
SCHOFIELD BARRACKS, HAWAII 96857-5000

March 12, 2003

Directorate of Public Works

Mr. Wilfred Nagamine
Manager, Clean Air Branch
Environmental Management Division
Hawaii State Department of Health
919 Ala Moana Boulevard, Room 203
Honolulu, Hawaii 96814

Dear Mr. Nagamine:

This letter is in response to a telephone conversation between Ms. Lisa Young of your staff and Ms. Debra Ikeno of my staff on March 11, 2003 requesting approval for prescribed burn at Schofield Barracks (West Range) on June 7-11, 2003. Hawaii Administrative Rules, Section 11-60.1-52, paragraph (b)(3) allows prescribed burning pending notification and approval from the State for fires to abate a fire hazard.

The purpose of the burn is to reduce the potential for wild fires, improve visibility of the ground, and allow surface clearance of unexploded ordnance.

A copy of a draft burn plan is enclosed for your reference.

Per the referenced telephone conversation, should approval be granted please provide written approval or if we do not hear from you by March 31, 2003 we will assume approval has been granted.

If there are any questions, please contact Ms. Debra Ikeno, Environmental Division, Directorate of Public Works, 656-2878, ext. 1059.

Sincerely,

for Floyd A. Quintana
Colonel, US Army
Director of Public Works

Enclosure

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Box 50088
Honolulu, Hawaii 96850

1-2-2003-I-029

APR 16 2003

Colonel Floyd A. Quintana
Director of Public Works
Department of the Army
Headquarter, United States Army Garrison, Hawai'i
Schofield Barrack, Hawai'i 96857-5000

Re: Informal Consultation Under Section 7 of the Endangered Species Act for a prescribed burn, SB 03-01, at Schofield Barracks West Range and Impact Area on June 7-11, 2003.

Dear Colonel Quintana:

The U.S. Fish and Wildlife Service (Service) has received your March 12, 2003, letter and supporting documents requesting our concurrence under section 7 of the Endangered Species Act of 1973, as amended, (Act) with regard to application of the herbicide Roundup followed by a prescribed burn in the impact area of Schofield Barracks west range. As stated in your letter, the purpose of the proposed action is to reduce fuel loads that might otherwise support a severe wildfire, and to improve ground visibility for surface clearance of explosive ordinance in support of archeological surveys. The Service also understands that the Aerial Validation Plan for the herbicide application has received an initial approval, but final approval from the U.S. Army Environmental Center is still pending.

The Prescribed Burn Plan (SB 03-01) is complete and well prepared. It describes all of the essential elements for the carrying out the prescribed burn in a safe and successful manner, including the project location; objectives; desired effects and tolerable deviations; post-burn evaluation; fire prescription; smoke management; weather; line construction and pre-treatment; holding plan, equipment, and personnel; the fire contingency plan; a general risk assessment; and a safety plan. Maps of the area are also included. The Aerial Validation Plan for the application of the herbicide to the burn areas also appears to be complete. Application will occur only when wind speeds are between 2-10 miles per hour and from a height of approximately 10 feet. The application will also employ a drift retardant to further reduce effects to non-target areas.

Critical elements for the burn plan and the aerial herbicide spray are as follows:

- The forested area west and north of the Schofield Barrack impact area contains 20 federally listed plants, one federally listed tree snail, and one federally listed bird (see attached species list). This area also contains some of the designated critical habitat for the bird and some of the proposed critical habitat for the plants. It is important that these federal trust resources are protected.

- The south firebreak road network, Kolekole Avenue, and the Schofield firebreak road and interior roads need to be well maintained so that fire fighting vehicles can access critical areas and effectively contain the fire within the impact area. The current burn plan and maps indicate that this expectation will be met. The maps clearly indicate areas of the firebreak road that will be improved prior to the prescribed burn. The Service concurs that it is essential to maintain the main firebreak around the Schofield Barrack impact area so that it is an effective barrier against fire and provides easy access for fire fighting equipment and crews.

- Pursuant to the documentation, we agree that aerial application and drift of the herbicide should not extend beyond the firebreak road that outlines the western and north boundaries of the impact area. In particular, the herbicide should not effect the locations of listed plant species or designated or proposed critical habitats. The current Aerial Validation Plan indicates that this expectation will be met.

- The Service is concerned that a large on-site water source for fighting a wildfire, such as a dip pond, is not currently in place. Since reducing the fuel load of the impact area is a good precautionary action for protecting federally listed species, and since the wet season reduces the likelihood of a wildfire, the Service does not view the lack of a dip pond as significant enough to stop the prescribed burn at the scheduled time. However, a similar request during a more fire prone season would be viewed as a higher risk to federally listed species and so would require a higher level of precaution. One or more dip ponds in close vicinity to the Schofield Barrack impact area would significantly help alleviate our concerns. We strongly urge the Army to build and maintain additional dip ponds at Schofield Barracks.

Since there are not federally listed species within the Schofield Barracks impact area or within the proposed burn areas, and since the Prescribed Burn Plan and the Aerial Validation Plan adequately address the concerns of the Service, we concur that the proposed Prescribed Burn, SB 03-01, in Schofield Barracks west range and impact area is not likely to adversely affect federally listed species and is not likely to adversely modify designated or proposed critical habitat.

If you have any questions, please contact Stephen E. Miller by telephone at (808) 541-3441 or by facsimile transmission at (808) 541-3470.

Sincerely,

Paul Henson

Paul Henson, Ph.D.
Field Supervisor
Ecological Services, Pacific Islands Office

ATTACHMENT:

Species within Schofield Barracks Military Reservation

Abutilon sandwicense
Alectryon macrococcus var. *macrococcus*
Cyanea acuminata
Cyanea grimesiana ssp. obatae
Delissea subcordata
Diellia falcata
Flueggea neowawraea
Gardenia mannii
Hesperomannia arborescens
Isodendrion longifolium
Lepidium arbuscula
Lobelia oahuensis
Phyllostegia hirsuta
Phyllostegia kaalaensis
Phyllostegia mollis
Plantago princeps var. *princeps*
Schiedea hookeri
Schiedea kaalae
Viola chamissoniana ssp. chamissoniana
Achatinella mustelina, O`ahu tree snail
Lasiurus cinereus semotus, hoary bat
Chasiempis sandwichensis ibidis, O`ahu elepaio

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
SCHOFIELD BARRACKS, HAWAII 96857-5000

REPLY TO
ATTENTION OF

Directorate of Public Works

March 12, 2003

Dr. Paul Henson
Field Supervisor
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard
Room 3-122, Box 50088
Honolulu, Hawaii 96850

SUBJECT: Informal Consultation for Prescribed Burn, SB 03-01, Schofield Barracks West Range and Impact Area

Dear Dr. Henson:

This letter is to inform you that the Army is planning to conduct controlled prescribed fires on 1,200-1,500 acres that are part of the designated impact area at Schofield Barracks (West Range) and within the Schofield Barracks firebreak road network. See enclosed map. The prescribed burn is scheduled during June 7-11, 2003.

The purpose of the controlled fires is two-fold: 1) reduce fuel loads and abate a severe wildfire hazard caused by heavy fuel buiildup, and 2) provide ground visibility essential to conducting surface clearance by Explosive Ordnance Disposal (EOD) personnel and subsequent archaeological surveys. Also, in the future, as part of the wildland fire management plan being developed for Schofield Barracks, prescribed burning will be considered and implemented as necessary on an annual basis to continue to manage fuel loads and avoid hazardous fire conditions.

The UXO clearance and follow-on archaeological surveys that are part of this request are a requirement of the environmental documentation being prepared for the proposed Battle Area Complex (BAX) at Schofield Barracks. The BAX is part of the Army's proposed Transformation Program in Hawaii.

We request that the Service review the enclosed prescribed burn plan for this action prepared by the Installation Fire & Safety Office (IFSO), U.S. Army Garrison, Hawaii. In preparation for the actual prescribed burn, IFSO is also proposing to do aerial application of a herbicide ("Roundup") to enhance the effectiveness of the burn. We are in the process of preparing an "aerial validation plan for herbicide application" that will be submitted to the U.S. Army Environmental Center for approval. After approval, we will send you a copy of the plan.

The IFSO is confident that the burn plan actions will adequately control the fires and keep them contained within the impact area. No fires will cross the firebreak road and enter adjacent forested areas that are immediately upslope and to the west of the prescribed burn area. These higher elevation

forests contain several endangered plant species, and the elepaio (an endangered bird) and portions of its critical habitat. The proposed aerial application of herbicide should also not affect this area. The application of herbicide will be accomplished to minimize the effect of drift on endangered plant and bird species and their habitat. Other forested areas further to the south include parts of The Nature Conservancy of Hawaii's Honouliuli Preserve and also contain endangered plants and the elepaio. But again, application procedures will be designed to minimize the drift of herbicide outside the SB impact area and the increased distance (over a kilometer away) should result no impacts to the preserve. In summary, we feel confident that the proposed action will not adversely affect any listed species or its habitat.

Due to the urgency of this project, we would appreciate your assistance in completing this consultation by April 15, 2003. If you have any questions or would like to meet to discuss this project, please call Mr. Joel Godfrey, DPW Biologist at 656-1289 ext. 1050 or Mr. Gayland Enriques, Wildland Fire Protection Specialist, IFSO, at 656-0615.

Sincerely,

for Floyd A. Quintana
Colonel, U.S. Army
Director of Public Works

Enclosures

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
SCHOFIELD BARRACKS, HAWAII 96857-5000

March 18, 2003

REPLY TO
ATTENTION
OF:

Directorate of Public Works

Mr. Peter Young
State Historic Preservation Officer
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, HI 96707

Dear Mr. Young:

This letter is to open consultation with your office under Section 106 of the National Historic Preservation Act of 1966, as amended, concerning a planned controlled prescribed burn at the Schofield Barracks, Island of Oahu. The burn is currently scheduled for May 2003. The draft burn plan is attached to aid in your review of this project.

The purpose of the burn is twofold. It will aid in the evaluation of cultural sites in the footprint of two proposed projects for the transformation of the 2nd Brigade of the 25th Infantry Division into a Stryker Brigade Combat Team (SBCT), the Battle Area Course and Qualifying Training Range #1. It will also aid in the detection and demolition of unexploded ordnance in the project footprint, which is in the existing impact area at Schofield Barracks.

To support these activities, a prescribed burn must first be conducted, subject to specific funding for UXO clearance, safety requirements, and any limitations imposed by the U.S. Fish and Wildlife Service in our consultations. Archaeologists under contract to the U.S. Army Garrison, Hawaii will be present during the burn and will survey the burned areas for the presence of archaeological sites with the unexploded ordnance detail when the burn is completed. Additional Section 106 consultation will take place before any unexploded ordnance in the vicinity of an archaeological site is detonated.

This area of Schofield Barracks was surveyed for the presence of archaeological sites in 1998. The survey consisted of pedestrian survey in the gulches and low-level helicopter survey of the upper areas to try to detect any surface indications of sites. Although sites were discovered in the gulches, there were no indications of sites remaining on the higher elevations in the impact area.

We ask you to concur with a "no adverse effect" determination for the execution of the controlled burn at Schofield Barracks.

This letter is also being transmitted to the Office of Hawaiian Affairs, Hui Malama I Na Kupuna O Hawaii Nei and the Oahu Burial Council.

If you have any further questions on this project, please contact Dr. Laurie Lucking, Cultural Resources Manager, Environmental Division, Directorate of Public Works, at (808) 656-2878 ext. 1052.

Sincerely,

Floyd A. Quintana
Colonel, US Army
Director of Public Works

Enclosure

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
SCHOFIELD BARRACKS, HAWAII 96857-5000

March 18, 2003

REPLY TO
ATTENTION
OF:

Directorate of Public Works

Mr. A. Van Horn Diamond, Chair
Oahu Island Burial Council
2101 Nuuanu Avenue, Room 1304
Honolulu, HI 96817

Dear Mr. Diamond:

This letter is to open consultation with your office under Section 106 of the National Historic Preservation Act of 1966, as amended, concerning a planned controlled prescribed burn at the Schofield Barracks, Island of Oahu. The burn is currently scheduled for May 2003. The draft burn plan is attached to aid in your review of this project.

The purpose of the burn is twofold. It will aid in the evaluation of cultural sites in the footprint of two proposed projects for the transformation of the 2nd Brigade of the 25th Infantry Division into a Stryker Brigade Combat Team (SBCT), the Battle Area Course and Qualifying Training Range #1. It will also aid in the detection and demolition of unexploded ordnance in the project footprint, which is in the existing impact area at Schofield Barracks.

To support these activities, a prescribed burn must first be conducted, subject to specific funding for UXO clearance, safety requirements, and any limitations imposed by the U.S. Fish and Wildlife Service in our consultations. Archaeologists under contract to the U.S. Army Garrison, Hawaii will be present during the burn and will survey the burned areas for the presence of archaeological sites with the unexploded ordnance detail when the burn is completed. Additional Section 106 consultation will take place before any unexploded ordnance in the vicinity of an archaeological site is detonated.

This area of Schofield Barracks was surveyed for the presence of archaeological sites in 1998. The survey consisted of pedestrian survey in the gulches and low-level helicopter survey of the upper areas to try to detect any surface indications of sites. Although sites were discovered in the gulches, there were no indications of sites remaining on the higher elevations in the impact area.

We are asking for your review and comments of the proposed burn only. The SBCT projects are being covered under separate Section 106 consultations. We would appreciate your comments no later than April 15, 2003. This letter is also being transmitted to the State Historic Preservation Division, the Office of Hawaiian Affairs, and Hui Malama I Na Kupuna O Hawaii Nei.

If you have any further questions on this project, please contact Dr. Laurie Lucking, Cultural Resources Manager, Environmental Division, Directorate of Public Works, at (808) 656-2878 ext. 1052.

Sincerely,

Floyd A. Quintana
Colonel, US Army
Director of Public Works

Enclosure

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD03/929

April 14, 2003

Floyd A. Quintana
Colonel, U.S. Army
Director of Public Works
Dept. of the Army
Headquarters, United States Army Garrison, Hawaii
Schofield Barracks, Hi 96857-5000

RE: Controlled Prescribed Burn at the Schofield Barracks, May 2003.

Dear Mr. Quintana,

OHA is in receipt of your March18, 2003 request for review and comment on the above referenced project.

By phone call to Dr. Lori Lucking, we requested that you consult with Shad Kane, Chair of the Historic Preservation Committee, Oahu Council of Hawaiian Civic Clubs. Mr. Kane sits on the Transformation Community Advisory Council, so Dr. Lucking has his number. Mr. Kane had requested a site visit of the planned burn area. OHA hopes that you comply with his request.

We have also forwarded the information sent to us to Mr. Trae Menard at the Nature Conservancy, and encourage you to gather their response prior to conducting the controlled burn.

OHA understands that the burn will reduce the possibility of summer wildfires in the training area. We also understand that engines, water tankers and helicopters will be on standby to ensure the burn is within tolerance limits.

OHA will agree to a "no adverse impact" finding if the following mitigation measures are undertaken.

1. Mr. Kane is allowed a site visit of the area to ensure that no historic sites will be adversely impacted. OHA's main concern is that UXO not impact historic sites during the burn.
2. Mr. Kane be allowed to inspect the site after the burn.
3. Water helicopters, fire engines and water tanks are at standby during the entire burn.

Thank you for the opportunity to review and comment on this project. If you have further questions, please contact Pua Aiu at 594-1931 or e-mail her at paiu@oha.org.

Sincerely,

Peter L. Yee
Director
Nationhood and Native Rights.

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
SCHOFIELD BARRACKS, HAWAII 96857-5000

March 18, 2003

REPLY TO
ATTENTION
OF:

Directorate of Public Works

Mrs. Haunani Apoliona
Chairperson the Trustees
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Fifth Floor
Honolulu, HI 96813

Dear Mrs. Apoliona:

This letter is to open consultation with your office under Section 106 of the National Historic Preservation Act of 1966, as amended, concerning a planned controlled prescribed burn at the Schofield Barracks, Island of Oahu. The burn is currently scheduled for May 2003. The draft burn plan is attached to aid in your review of this project.

The purpose of the burn is twofold. It will aid in the evaluation of cultural sites in the footprint of two proposed projects for the transformation of the 2nd Brigade of the 25th Infantry Division into a Stryker Brigade Combat Team (SBCT), the Battle Area Course and Qualifying Training Range #1. It will also aid in the detection and demolition of unexploded ordnance in the project footprint, which is in the existing impact area at Schofield Barracks.

To support these activities, a prescribed burn must first be conducted, subject to specific funding for UXO clearance, safety requirements, and any limitations imposed by the U.S. Fish and Wildlife Service in our consultations. Archaeologists under contract to the U.S. Army Garrison, Hawaii will be present during the burn and will survey the burned areas for the presence of archaeological sites with the unexploded ordnance detail when the burn is completed. Additional Section 106 consultation will take place before any unexploded ordnance in the vicinity of an archaeological site is detonated.

This area of Schofield Barracks was surveyed for the presence of archaeological sites in 1998. The survey consisted of pedestrian survey in the gulches and low-level helicopter survey of the upper areas to try to detect any surface indications of sites. Although sites were discovered in the gulches, there were no indications of sites remaining on the higher elevations in the impact area.

We are asking for your review and comments of the proposed burn only. The SBCT projects are being covered under separate Section 106 consultations. We would appreciate your comments no later than April 15, 2003. This letter is also being transmitted to the State Historic Preservation Division, the Oahu Burial Council, and Hui Malama I Na Kupuna O Hawaii Nei.

If you have any further questions on this project, please contact Dr. Laurie Lucking, Cultural Resources Manager, Environmental Division, Directorate of Public Works, at (808) 656-2878 ext. 1052.

Sincerely,

Floyd A. Quintana
Colonel, US Army
Director of Public Works

Enclosure

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
SCHOFIELD BARRACKS, HAWAII 96857-5000

March 18, 2003

REPLY TO
ATTENTION
OF:

Directorate of Public Works

Mr. Kunani Nihipali, Po'o
Hui Malama I Na Kupuna O Hawaii Nei
P. O. Box 190
Haleiwa, HI 96817

Dear Mr. Nihipali:

This letter is to open consultation with your office under Section 106 of the National Historic Preservation Act of 1966, as amended, concerning a planned controlled prescribed burn at the Schofield Barracks, Island of Oahu. The burn is currently scheduled for May 2003. The draft burn plan is attached to aid in your review of this project.

The purpose of the burn is twofold. It will aid in the evaluation of cultural sites in the footprint of two proposed projects for the transformation of the 2nd Brigade of the 25th Infantry Division into a Stryker Brigade Combat Team (SBCT), the Battle Area Course and Qualifying Training Range #1. It will also aid in the detection and demolition of unexploded ordnance in the project footprint, which is in the existing impact area at Schofield Barracks.

To support these activities, a prescribed burn must first be conducted, subject to specific funding for UXO clearance, safety requirements, and any limitations imposed by the U.S. Fish and Wildlife Service in our consultations. Archaeologists under contract to the U.S. Army Garrison, Hawaii will be present during the burn and will survey the burned areas for the presence of archaeological sites with the unexploded ordnance detail when the burn is completed. Additional Section 106 consultation will take place before any unexploded ordnance in the vicinity of an archaeological site is detonated.

This area of Schofield Barracks was surveyed for the presence of archaeological sites in 1998. The survey consisted of pedestrian survey in the gulches and low-level helicopter survey of the upper areas to try to detect any surface indications of sites. Although sites were discovered in the gulches, there were no indications of sites remaining on the higher elevations in the impact area.

We are asking for your review and comments of the proposed burn only. The SBCT projects are being covered under separate Section 106 consultations. We would appreciate your comments no later than April 15, 2003. This letter is also being transmitted to the State Historic Preservation Division, the Office of Hawaiian Affairs, and the Oahu Burial Council.

If you have any further questions on this project, please contact Dr. Laurie Lucking, Cultural Resources Manager, Environmental Division, Directorate of Public Works, at (808) 656-2878 ext. 1052.

Sincerely,

Floyd A. Quintana
Colonel, US Army
Director of Public Works

Enclosure

LINDA LINGLE
Governor

SANDRA LEE KUNIMOTO
Chairperson, Board of Agriculture

DIANE LEY
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
Pesticides Branch
1428 South King Street
Honolulu, Hawaii 96814-2512
Phone: (808) 973-9401 Fax: (808) 973-9418

April 15, 2003

Floyd A. Quintana
Colonel, US Army
Director of Public Works
Department of the Army
Headquarters, United States Army Garrison, Hawaii
Schofield Barracks, Hawaii 96857-5000

Dear Colonel Quintana:

Your letter of April 11, 2003 advised that Roundup Pro, EPA Registration No. 524-475 would be used to dry vegetation to enhance a burn of approximately 1500 acres within the Schofield Barracks Military Reservation, West Range, north of Kolekole Road and within the Schofield Firebreak Road. Since Round-up Pro is not classified as a restricted-use pesticide, no permit is required.

You must comply with all labeling. Please provide Steven Ogata, Enforcement Supervisor for Oahu, with a copy of the spray schedule to monitor the application. Mr. Ogata's phone number is (808) 973-9405.

Should you have any questions, please call me at (808) 973-9404.

Sincerely,

Robert A. Boesch

ROBERT A. BOESCH
Pesticides Program Manager

cc: Steven Ogata

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
SCHOFIELD BARRACKS, HAWAII 96857-5000

APR 1 1 2002

REPLY TO
ATTENTION OF:

Directorate of Public Works

Mr. Robert Boesch
Program Manager
Pesticides Branch
Hawaii Department of Agriculture
1428 South King Street
Honolulu, HI 96814

Dear Mr. Boesch:

This letter is in response to a telephone conversation between Mr. Mann Ko of your staff and Mr. Richard Min of my Staff on April 8, 2003 requesting exemption for aerial application herbicide at Schofield Barracks (West Range) on May 17-24, 2003.

The purpose of the herbicide is to dry vegetation, allowing for the prescribed burn scheduled June 7-11, 2003.

A copy of the Aerial Validation Plan for Herbicide Application is enclosed for your reference.

Per the referenced telephone conversation, should approval be granted please provide written approval or if we do not hear from you by April 24, 2003 we will assume approval has been granted.

If there are any questions, please contact Mr. Richard Min, Environmental Division, Directorate of Public Works, 656-2878, ext. 1061.

Sincerely,

for Floyd A. Quintana
Colonel, US Army
Director of Public Works

Enclosure

AERIAL VALIDATION PLAN FOR HERBICIDE APPLICATION FOR SBCT PRESCRIBED BURN

Activity Preparing Request: Installation Fire & Safety Office, U.S. Army Garrison Hawaii, Department of the Army.

Preparation Date: 13 March 2003, edited 28 March 2003

Preparer: Robin Yamamoto, Entomologist, Installation Pest Management Coordinator, Environmental Division, Directorate of Public Works, U.S. Army Garrison, Hawaii.

Purpose: Execution of this herbicide treatment plan is necessary to augment the prescribed burn plan required by the Army to prepare for construction of the proposed Multipurpose Combined Arms Live Fire Range Complex and Qualification Ranges for SBCT. The SBCT Prescribed Burn Plan is attached.

The objective of this plan is to dry vegetation to the degree that a complete burn will result, allowing the prescribed fire objectives to be met (paragraph 2 of the SBCT Prescribed Burn Plan).

If herbicide application is not done prior to the burn, an incomplete burn may result, and the objectives of the burn plan may not be met.

Because the proposed burn area is within an impact area, herbicide application can only be done by aerial application.

Pests Identified: The primary targets are Guinea Grass, *Panicum maximum,* 4-6 feet tall, Haole Koa, *Leucaena leucocephalal,* 4-6 feet tall, Molasses Grass, 2.5 feet tall, and Christmas Berry, *Schinus*, 8-10 feet tall.

Surveillance: Areas requiring herbicide are not accessible by ground application due to potential of life threat to personnel from UXO in the designated burn areas. Pre and post surveillance procedures are predicated on known impact areas where access is prohibited.

Target Area Description: The area proposed for treatment is located in the designated impact area of the Schofield Barracks Military Reservation (SBMR), West Range, north of Kolekole Road and within the Schofield Firebreak Road (see map).

A total of approximately 1500 acres may be treated in the designated impact area of the Schofield Barracks (West Range) and within the Schofield firebreak road network.

Proximity to Inhabited Areas: Military Family Housing units located approximately 750-meters east of treatment area.

Affected Natural Resources: There are no endangered species, wildlife communities, agriculture, livestock areas, etc., in the treatment area. Higher elevation forests immediately upslope and to the west of the target area contain several endangered plant species, and the elepaio (an endangered bird) and portions of its critical habitat. Other forested areas further to the south include parts of The Nature Conservancy of Hawaii's Honouliuli Preserve and also contain endangered plants and the elepaio. Drift to these surrounding areas will be controlled by adding a drift retardant (Airex DC at 0.75%) to the spray, and by applying only when wind speeds are below threshold limits, and by limiting the height at which the application is done.

Affected Area Water Resources: There are no areas where surface water is present. Drainage gullies are present. If heavy rains occur prior to application, it will be postponed until there is complete drainage.

Drift Affecting Natural Resources: Application will only occur when wind speeds are between 2-10 mph and no precipitation. According to the label for Roundup Pro, drift potential is lowest when wind speeds are between 2-10 mph. The label also states that application should be avoided below 2 mph due to variable winds and high inversion potential. The Army will cease all application operations if conditions exceed the above parameters. Also, the Army will cease all application operations if it is observed that there is risk of drift affecting elepaio Critical Habitat or areas occupied by threatened and endangered species (see attached map).

Pesticide Information: The herbicide to be used is Roundup Pro (41% glyphosate), NSN: 6840-01-108-9578, EPA Registration Number: 524-475.

The material is to be applied at a rate of 3 quarts/acre (20 gallons of 3.75% solution per acre). Total amount of product for 1500 acres is 1125 gallons of Roundup Pro concentrate.

The attached MSDS describes toxicity, stability and degradation characteristics.

The main restrictions on the use of the product are to avoid areas where surface water is present and not to mix store or apply the product or spray solutions in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

Application Information: Application of the material will be done by contract using Murray Ag Inc., License No. 10668311. The applicator will be Mr. Ronald Goins, State of Hawaii Pesticide Applicator Certification No. B50583, category 11, expiration date May 03.

Application will be done utilizing a Jet Ranger helicopter at airspeeds of approximately 70 mph. Application will be done at a height not greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. The spray swath will be approximately 40 feet.

Spraying is scheduled to begin 17 May 03 and to continue until 24 May 03, if necessary, to complete the one time application.

Alternative Control Methods: As an alternative, the range may be burned without the use of an herbicide; however, as discussed previously, an incomplete burn may result and the objectives of the burn plan may not be met.

Sensitive Areas: There are no protected species habitats, crop lands, lakes, rivers, running streams, etc., in the treatment area.

Agency Coordination: NEPA documentation, and consultation with State of Hawaii Department of Agriculture and USFWS, will be done prior to treatment.

Environmental Documentation: This Aerial Validation Plan will be included in the Environmental Assessment for the SBCT Prescribed Burn Plan.

APPENDIX E

MATERIAL SAFETY DATA SHEETS (MSDS)

ROUNDUP PRO® Herbicide

Version: 1.1
Effective date: 07/25/2001

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: ROUNDUP PRO® Herbicide
EPA Reg. No.: 524-475
Product use: Herbicide
Chemical name: Not applicable
Synonyms: None
Company: MONSANTO Company, 800 N. Lindbergh Blvd., St. Louis, MO, 63167
Telephone: 800-332-3111, **Fax:** 314-694-5557
Emergency numbers
FOR CHEMICAL EMERGENCY, SPILL LEAK, FIRE, EXPOSURE, OR ACCIDENT Call CHEMTREC - Day or Night: 1-800-424-9300 toll free in the continental U.S., Puerto Rico, Canada, or Virgin Islands. For calls originating elsewhere: 703-527-3887 (collect calls accepted).
FOR MEDICAL EMERGENCY - Day or Night: 314-694-4000 (collect calls accepted).

2. COMPOSITION/INFORMATION ON INGREDIENTS

Active ingredient
Isopropylamine salt of N-(phosphonomethyl)glycine; {Isopropylamine salt of glyphosate}
Composition

COMPONENT	CAS No.	% by weight (approximate)
Isopropylamine salt of glyphosate	38641-94-0	41
Surfactant		14.5
Water and minor formulating ingredients		44.5

OSHA Status: This product is hazardous according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

Emergency overview
Appearance and odour (colour/form/odour): Clear - Amber / Liquid / Sweet
CAUTION!
CAUSES EYE IRRITATION
Potential health effects
Likely routes of exposure: Skin contact, eye contact
Eye contact, short term: May cause temporary eye irritation.
Skin contact, short term: Not expected to produce significant adverse effects when recommended use instructions are followed.
Inhalation, short term: Not expected to produce significant adverse effects when recommended use instructions are followed.
Refer to section 11 for toxicological and section 12 for environmental information.

4. FIRST AID MEASURES

Eye contact
Immediately flush with plenty of water.
If easy to do, remove contact lenses.
Skin contact
Take off contaminated clothing, wristwatch, jewellery.
Wash affected skin with plenty of water.
Wash clothes before re-use.
Inhalation: Remove to fresh air.
Ingestion
Immediately offer water to drink.
Do NOT induce vomiting unless directed by medical personnel.
If symptoms occur, get medical attention.
Advice to doctors: This product is not an inhibitor of cholinesterase.
Antidote: Treatment with atropine and oximes is not indicated.

5. FIRE FIGHTING MEASURES

Flash point: none
Extinguishing media: Recommended: Water, foam, dry chemical, carbon dioxide (CO2)
Unusual fire and explosion hazards
Minimize use of water to prevent environmental contamination.
Environmental precautions: see section 6.
Hazardous products of combustion: Carbon monoxide (CO), phosphorus oxides (PxOy), nitrogen oxides (NOx)
Fire fighting equipment
Self-contained breathing apparatus.
Equipment should be thoroughly decontaminated after use.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Use personal protection recommended in section 8.
Environmental precautions
SMALL QUANTITIES:
Low environmental hazard.
LARGE QUANTITIES:
Minimize spread.
Keep out of drains, sewers, ditches and water ways.
Notify authorities.
Methods for cleaning up
SMALL QUANTITIES:
Flush spill area with water.
LARGE QUANTITIES:
Absorb in earth, sand or absorbent material.
Dig up heavily contaminated soil.
Collect in containers for disposal.
Refer to section 7 for types of containers.
Flush residues with small quantities of water.
Minimize use of water to prevent environmental contamination.
Refer to section 13 for disposal of spilled material.

7. HANDLING AND STORAGE

Good industrial practice in housekeeping and personal hygiene should be followed.
Handling
When using do not eat, drink or smoke.
Wash hands thoroughly after handling or contact.
Thoroughly clean equipment after use.
Do not contaminate drains, sewers and water ways when disposing of equipment rinse water.
Emptied containers retain vapour and product residue.
Refer to section 13 for disposal of rinse water.
Observe all labelled safeguards until container is cleaned, reconditioned or destroyed.
Storage
Minimum storage temperature: -15°C
Maximum storage temperature: 50°C
Compatible materials for storage: stainless steel, aluminium, fibreglass, plastic, glass lining
Incompatible materials for storage: galvanised steel, unlined mild steel, see section 10.
Keep out of reach of children.
Keep away from food, drink and animal feed.
Keep only in the original container.
Partial crystallization may occur on prolonged storage below the minimum storage temperature.
If frozen, place in warm room and shake frequently to put back into solution.
Minimum shelf life: 5 years.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne exposure limits

Components	Exposure Guidelines
Isopropylamine salt of glyphosate	No specific occupational exposure limit has been established.
Surfactant	No specific occupational exposure limit has been established.
Water and minor formulating ingredients	No specific occupational exposure limit has been established.

Engineering controls: No special requirement when used as recommended.
Eye protection: No special requirement when used as recommended.
Skin protection
If repeated or prolonged contact:
Wear chemical resistant gloves.
Respiratory protection: No special requirement when used as recommended.
When recommended, consult manufacturer of personal protective equipment for the appropriate type of equipment for a given application.

9. PHYSICAL AND CHEMICAL PROPERTIES

These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

Colour/colour range:	Clear - Amber
Form:	Liquid
Odour:	Sweet
Flash point:	none
Specific gravity:	1.169 @ 20°C / 15.6°C
Solubility:	Water: Completely miscible.
pH:	4.4 - 5.0
Partition coefficient (log Pow):	< 0.00 (active ingredient)

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions of handling and storage.
Hazardous decomposition: Thermal decomposition: Hazardous products of combustion: see section 5.
Materials to avoid/Reactivity: Reacts with galvanised steel or unlined mild steel to produce hydrogen, a highly flammable gas that could explode.

11. TOXICOLOGICAL INFORMATION

This section is intended for use by toxicologists and other health professionals.
Data obtained on product and components are summarized below.
Acute oral toxicity
Rat, LD50: 5,108 mg/kg body weight
Practically non-toxic.
FIFRA category IV.
Acute dermal toxicity
Rat, LD50 (limit test): > 5,000 mg/kg body weight
Practically non-toxic.
FIFRA category IV.
No mortality.
Acute inhalation toxicity
Rat, LC50, 4 hours, aerosol: 2.9 mg/L
Other effects: weight loss, breathing difficulty
Practically non-toxic.
FIFRA category IV.
Skin irritation
Rabbit, 6 animals, OECD 404 test:
Days to heal: 3
Primary Irritation Index (PII): 0.5/8.0
Essentially non irritating.
FIFRA category IV.
Eye irritation
Rabbit, 6 animals, OECD 405 test:
Days to heal: 3
Slight irritation.
FIFRA category III.
Skin sensitization
Guinea pig, Buehler test:
Positive incidence: 0 %
N- (phosphonomethyl)glycine; {glyphosate}
Mutagenicity
In vitro and in vivo mutagenicity test(s): Not mutagenic.
Repeated dose toxicity
Rabbit, dermal, 21 days:
NOAEL toxicity: > 5,000 mg/kg body weight/day
Target organs/systems: none
Other effects: none
Rat, oral, 3 months:

NOAEL toxicity: > 20,000 mg/kg diet
Target organs/systems: none
Other effects: none
Carcinogenicity
Mouse, oral, 24 months:
NOEL tumour: > 30,000 mg/kg diet
NOAEL toxicity: ~ 5,000 mg/kg diet
Tumours: none
Target organs/systems: liver
Other effects: decrease of body weight gain, histopathologic effects
Rat, oral, 24 months:
NOEL tumour: > 20,000 mg/kg diet
NOAEL toxicity: ~ 8,000 mg/kg diet
Tumours: none
Target organs/systems: eyes
Other effects: decrease of body weight gain, histopathologic effects
Toxicity to reproduction/fertility
Rat, oral, 3 generations:
NOAEL toxicity: > 30 mg/kg body weight
NOAEL reproduction: > 30 mg/kg body weight
Target organs/systems in parents: none
Other effects in parents: none
Target organs/systems in pups: none
Other effects in pups: none
Developmental toxicity/teratogenicity
Rat, oral, 6 - 19 days of gestation:
NOAEL toxicity: 1,000 mg/kg body weight
NOAEL development: 1,000 mg/kg body weight
Other effects in mother animal: decrease of body weight gain, decrease of survival
Developmental effects: weight loss, post-implantation loss, delayed ossification
Effects on offspring only observed with maternal toxicity.
Rabbit, oral, 6 - 27 days of gestation:
NOAEL toxicity: 175 mg/kg body weight
NOAEL development: 175 mg/kg body weight
Target organs/systems in mother animal: none
Other effects in mother animal: decrease of survival
Developmental effects: none

12. ECOLOGICAL INFORMATION

This section is intended for use by ecotoxicologists and other environmental specialists.
Data obtained on product and components are summarized below.
Aquatic toxicity, fish
Rainbow trout (Oncorhynchus mykiss):
Acute toxicity, 96 hours, static, LC50: 5.4 mg/L moderately toxic
Bluegill sunfish (Lepomis macrochirus):
Acute toxicity, 96 hours, static, LC50: 7.3 mg/L moderately toxic
Aquatic toxicity, invertebrates
Water flea (Daphnia magna):
Acute toxicity, 48 hours, static, EC50: 11 mg/L slightly toxic
Avian toxicity
Mallard duck (Anas platyrhynchos):
Dietary toxicity, 5 days, LC50: > 5,620 mg/kg diet practically non-toxic
Bobwhite quail (Colinus virginianus):
Dietary toxicity, 5 days, LC50: > 5,620 mg/kg diet practically non-toxic
Arthropod toxicity
Honey bee (Apis mellifera):
Oral/contact, 48 hours, LD50: > 100 µg/bee practically non-toxic
Soil organism toxicity, invertebrates
Earthworm (Eisenia foetida):
Acute toxicity, 14 days, LC50: > 1,250 mg/kg soil practically non-toxic
N-(phosphonomethyl)glycine; (glyphosate)
Bioaccumulation
Bluegill sunfish (Lepomis macrochirus):
Whole fish: BCF: < 1
No significant bioaccumulation is expected.
Dissipation
Soil, field:
Half life: 2 - 174 days
Koc: 884 - 60,000 L/kg
Adsorbs strongly to soil.
Water, aerobic:
Half life: < 7 days

13. DISPOSAL CONSIDERATIONS

Product
Recycle if appropriate facilities/equipment available.
Burn in special, controlled high temperature incinerator.
Dispose of as hazardous industrial waste.
Keep out of drains, sewers, ditches and water ways.
Follow all local/regional/national regulations.
Container
Triple rinse empty containers.
Pour rinse water into spray tank.
Store for collection by approved waste disposal service.
Dispose of as non hazardous industrial waste.
Do NOT re-use containers.
Follow all local/regional/national regulations.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.
Not hazardous under the applicable DOT, ICAO/IATA, IMO, TDG and Mexican regulations.

15. REGULATORY INFORMATION

TSCA Inventory: All components are on the US EPA's TSCA Inventory
OSHA Hazardous Components: Surfactant
SARA Title III Rules
Section 311/312 Hazard Categories
Immediate
Section 302 Extremely Hazardous Substances
Not applicable.
Section 313 Toxic Chemical(s)
Not applicable.
CERCLA Reportable quantity: Not applicable.

16. OTHER INFORMATION

The information given here is not necessarily exhaustive but is representative of relevant, reliable data.
Follow all local/regional/national regulations.
Please consult supplier if further information is needed.
In this document the British spelling was applied.
All tests were conducted following OECD guidelines for Good Laboratory Practices (GLP).
The information given here is not necessarily exhaustive but is representative of relevant, reliable data.
For more information refer to product label.
Please consult Monsanto if further information is needed.
Follow all local/regional/national regulations.
® Registered trademark of Monsanto Company or its subsidiaries.
Full denomination of most frequently used acronyms. BCF (Bioconcentration Factor), BOD (Biochemical Oxygen Demand), COD (Chemical Oxygen Demand), EC50 (50% effect concentration), ED50 (50% effect dose), I.M. (intramuscular), I.P. (intraperitoneal), I.V. (intravenous), Koc (Soil adsorption coefficient), LC50 (50% lethality concentration), LD50 (50% lethality dose), LDLo (Lower limit of lethal dosage), LEL (Lower Explosion Limit), LOAEC (Lowest Observed Adverse Effect Concentration), LOAEL (Lowest Observed Adverse Effect Level), LOEC (Lowest Observed Effect Concentration), LOEL (Lowest Observed Effect Level), MEL (Maximum Exposure limit), MTD (Maximum Tolerated Dose), NOAEC (No Observed Adverse Effect Concentration), NOAEL (No Observed Adverse Effect Level), NOEC (No Observed Effect Concentration), NOEL (No Observed Effect Level), OEL (Occupational Exposure Limit), PEL (Permissible Exposure Limit), PII (Primary Irritation Index), Pow (Partition coefficient n-octanol/water), S.C. (subcutaneous), STEL (Short-Term Exposure Limit), TLV-C (Threshold Limit Value-Ceiling), TLV-TWA (Threshold Limit Value - Time Weighted Average), UEL (Upper Explosion Limit)
This Material Safety Data Sheet (MSDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA-APPROVED PRODUCT LABELING (attached to and accompanying the product container). This MSDS provides important health, safety, and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course. Use, storage and disposal of pesticide products are regulated by the EPA under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) through the product labeling, and all necessary and appropriate precautionary, use, storage, and disposal information is set forth on that labeling. It is a violation of federal law to use a pesticide product in any manner not prescribed on the EPA-approved label.
Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, MONSANTO Company makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for the purposes prior to use. In no event will MONSANTO Company be responsible for damages of any nature whatsoever resulting from the use of or reliance upon information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR TO THE PRODUCT TO WHICH INFORMATION REFERS.

In compliance with OSHA's
Hazard Communication Standard
29 CFR 1910, 1200

U.S. Department of Labor Form
Approved OMB 1218-0072

Airex DC™

Material Safety Data Sheet

Latest revision date:	11/01/00
Print date:	11/01/00
EMERGENCY PHONE NUMBER:	1-888-383-7293

PRODUCT IDENTIFICATION

Product name or number:	Airex DC™
Manufacturer's name	The Terawet Corporation
Address	10387 Friars Road San Diego, California 92120
Trade name	Airex DC™
Chemical name	Linear co-polymer with Humectants and Ammonium sulfate
Synonyms	None
Formula	Proprietary

HMIS HAZARD RATING

Health hazard (0-4)	0
Fire hazard (0-4)	0
Reactivity (0-4)	0
Personal protection	See section

HAZARDOUS INGREDIENTS DATA

As defined by OSHA Section 1910, 1200 this material is NON HAZARDOUS

PEL	N/A
Section 313	None
Reportable quantity	N/A

PHYSICAL DATA

Bulk Density/Specific Gravity	11.2 lb./gallon
Solubility in water	Infinite
Evaporation rate	Slower than water
Appearance	Clear to amber, non to mild citrus odor

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS | J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ETHYLENE GLYCOL

MSDS Number: E5125 --- *Effective Date: 11/02/01*

1. Product Identification

Synonyms: 1,2-Ethanediol; glycol; 1,2-Dihydroxyethane; Ethylene Alcohol; Ethulene Dihydrate
CAS No.: 107-21-1
Molecular Weight: 62.07
Chemical Formula: CH2OHCH2OH
Product Codes:
J.T. Baker: 5387, 5845, 9140, 9298, 9300, 9346, 9349, 9356, L715
Mallinckrodt: 5001, 5037

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Ethylene Glycol	107-21-1	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. MAY CAUSE ALLERGIC SKIN REACTION.

MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
Vapor inhalation is generally not a problem unless heated or misted. Exposure to vapors over an extended time period has caused throat irritation and headache. May cause nausea, vomiting, dizziness and drowsiness. Pulmonary edema and central nervous system depression may also develop. When heated or misted, has produced rapid, involuntary eye movement and coma.

Ingestion:
Initial symptoms in massive dosage parallel alcohol intoxication, progressing to CNS depression, vomiting, headache, rapid respiratory and heart rate, lowered blood pressure, stupor, collapse, and unconsciousness with convulsions. Death from respiratory arrest or cardiovascular collapse may follow. Lethal dose in humans: 100 ml (3-4 ounces).

Skin Contact:
Minor skin irritation and penetration may occur.

Eye Contact:
Splashes may cause irritation, pain, eye damage.

Chronic Exposure:
Repeated small exposures by any route can cause severe kidney problems. Brain damage may also occur. Skin allergy can develop. May damage the developing fetus.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye problems, or impaired liver, kidney, or respiratory function may be more susceptible to the effects of this substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:
Remove any contaminated clothing. Wash skin with soap and water for at least 15 minutes.

Get medical attention if irritation develops or persists.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

Give sodium bicarbonate intravenously to treat acidosis. Urinalysis may show low specific gravity, proteinuria, pyuria, cylindruria, hematuria, calcium oxide, and hippuric acid crystals. Ethanol can be used in antidotal treatment but monitor blood glucose when administering ethanol because it can cause hypoglycemia. Consider infusion of a diuretic such as mannitol to help prevent or control brain edema and hemodialysis to remove ethylene glycol from circulation.

---

5. Fire Fighting Measures

Fire:

Flash point: 111C (232F) CC

Autoignition temperature: 398C (748F)

Flammable limits in air % by volume:

lel: 3.2; uel: 15.3

Slight to moderate fire hazard when exposed to heat or flame.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Containers may explode when involved in a fire.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Water or foam may cause frothing. Water spray may be used to extinguish surrounding fire and cool exposed containers. Water spray will also reduce fume and irritant gases.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Toxic gases and vapors may be released if involved in a fire.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Separate from acids and oxidizing materials. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
50 ppm Ceiling

-ACGIH Threshold Limit Value (TLV):
50 ppm Ceiling (vapor)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face respirator with an organic vapor cartridge and particulate filter (NIOSH type P95 or R95 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH P100 or R100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. Please note that N series filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear oily liquid.
Odor:
Odorless.

Solubility:
Miscible in water.
Specific Gravity:
1.1 @20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
197.6C (388F)
Melting Point:
-13C (9F)
Vapor Density (Air=1):
2.14
Vapor Pressure (mm Hg):
0.06 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition. May produce acrid smoke and irritating fumes when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizing agents. Reacts violently with chlorosulfonic acid, oleum, sulfuric acid, perchloric acid. Causes ignition at room temperature with chromium trioxide, potassium permanganate and sodium peroxide; causes ignition at 212F(100C) with ammonium dichromate, silver chlorate, sodium chloride and uranyl nitrate.
Conditions to Avoid:
Heat, flames, ignition sources, water (absorbs readily) and incompatibles.

---

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 4700 mg/kg; skin rabbit LD50: 9530 mg/kg.
Irritation - skin rabbit: 555mg(open), mild; eye rabbit: 500mg/24H, mild.
Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Has shown teratogenic effects in laboratory animals.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Ethylene Glycol (107-21-1)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is not expected to evaporate significantly. When released into water, this material is expected to readily biodegrade. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material is not expected to significantly bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. When released into water, this material is not expected to evaporate significantly. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.
Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Ethylene Glycol (107-21-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

	--Canada--

Ingredient	Korea	DSL	NDSL	Phil.
Ethylene Glycol (107-21-1)	Yes	Yes	No	Yes

\Federal, State & International Regulations - Part 1\

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Ethylene Glycol (107-21-1)	No	No	Yes	No

\Federal, State & International Regulations - Part 2\

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Ethylene Glycol (107-21-1)	5000	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 1 Flammability: 1 Reactivity: 0
Label Hazard Warning:
WARNING! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. MAY CAUSE ALLERGIC SKIN REACTION. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.
Label Precautions:
Do not breathe vapor or mist.
Use only with adequate ventilation.
Keep container closed.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. Call a physician if irritation develops or persists. If swallowed, give water or milk to drink and induce vomiting. Never give anything by mouth to an unconscious person. In all cases call a physician.
Product Use:
Laboratory Reagent.

Revision Information:
MSDS Section(s) changed since last revision of document include: 8.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

POTASSIUM PERMANGANATE

MSDS Number: P6005 --- ***Effective Date: 11/02/01***

1. Product Identification

Synonyms: Permanganic acid, potassium salt; Condy's crystals
CAS No.: 7722-64-7
Molecular Weight: 158.03
Chemical Formula: KMnO4
Product Codes: J.T. Baker: 3227, 3228, 3232
Mallinckrodt: 7056, 7068

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Potassium Permanganate	7722-64-7	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. HARMFUL IF SWALLOWED OR INHALED.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Yellow (Reactive)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. High concentrations can cause pulmonary edema.
Ingestion:
Ingestion of solid or high concentrations causes severe distress of gastro-intestinal system with possible burns and edema; slow pulse; shock with fall of blood pressure. May be fatal. Ingestion of concentrations up to 1% causes burning of the throat, nausea, vomiting, and abdominal pain; 2-3% causes anemia and swelling of the throat with possible suffocation; 4-5% may cause kidney damage.
Skin Contact:
Dry crystals and concentrated solutions are caustic causing redness, pain, severe burns, brown stains in the contact area and possible hardening of outer skin layer. Diluted solutions are only mildly irritating to the skin.
Eye Contact:
Eye contact with crystals (dusts) and concentrated solutions causes severe irritation, redness, blurred vision and can cause severe damage, possibly permanent.
Chronic Exposure:
Prolonged skin contact may cause irritation, defatting, and dermatitis. Chronic manganese poisoning can result from excessive inhalation exposure to manganese dust and involves impairment of the central nervous system. Early symptoms include sluggishness, sleepiness, and weakness in the legs. Advanced cases have shown symptoms of fixed facial expression, emotional disturbances, spastic gait, and falling.
Aggravation of Pre-existing Conditions:
No information found.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing

contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:

Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Contact with oxidizable substances may cause extremely violent combustion.

Explosion:

Strong oxidants may explode when shocked, or if exposed to heat, flame, or friction. Also may act as initiation source for dust or vapor explosions. Contact with oxidizable substances may cause extremely violent combustion. Sealed containers may rupture when heated. Sensitive to mechanical impact.

Fire Extinguishing Media:

Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire. Suffocating type extinguishers are not as effective as water. Do not allow water runoff to enter sewers or waterways.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. *Handling and Storage*

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage and moisture. Isolate from any source of heat or ignition. Avoid storage on wood floors. Separate from incompatibles, combustibles, organic or other readily oxidizable materials. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
5 mg/m3 Ceiling for manganese compounds as Mn

- ACGIH Threshold Limit Value (TLV):
0.2 mg/m3 (TWA) for manganese, elemental and inorganic compounds as Mn

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Purple-bronze crystals.

Odor:
Odorless.

Solubility:
7 g in 100 g of water.

Density:
2.7

pH:
No information found.

% Volatiles by volume @ 21C (70F):

0
Boiling Point:
Not applicable.
Melting Point:
ca. 240C (ca. 464F)
Vapor Density (Air=1):
5.40
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Toxic metal fumes may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Powdered metals, alcohol, arsenites, bromides, iodides, phosphorous, sulfuric acid, organic compounds, sulfur, activated carbon, hydrides, strong hydrogen peroxide, ferrous or mercurous salts, hypophosphites, hyposulfites, sulfites, peroxides, and oxalates.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Investigated as a mutagen, reproductive effector. Oral rat LD50: 1090 mg/kg.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Potassium Permanganate (7722-64-7)	No	No	None

---

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
This material may be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, POTASSIUM PERMANGANATE
Hazard Class: 5.1
UN/NA: UN1490
Packing Group: II
Information reported for product/size: 110LB

International (Water, I.M.O.)

Proper Shipping Name: POTASSIUM PERMANGANATE
Hazard Class: 5.1
UN/NA: UN1490
Packing Group: II
Information reported for product/size: 110LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Potassium Permanganate (7722-64-7)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Potassium Permanganate (7722-64-7)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Potassium Permanganate (7722-64-7)	No	No	No	Manganese co

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Potassium Permanganate (7722-64-7)	100	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: 2Y
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 1 Flammability: 0 Reactivity: 0 Other: **Oxidizer**
Label Hazard Warning:
DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. HARMFUL IF SWALLOWED OR INHALED.
Label Precautions:
Keep from contact with clothing and other combustible materials.
Store in a tightly closed container.
Do not store near combustible materials.
Remove and wash contaminated clothing promptly.
Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but

makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

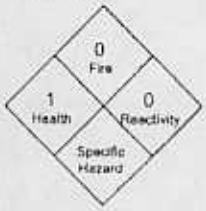
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MATERIAL SAFETY DATA SHEET

FIRE-TROL HOLDINGS, L.L.C.

FIRE-TROL® LCG-R, LIQUID CONCENTRATE

Fire-Trol Holdings, L.L.C.
2620 N. 37th Dr.
Phoenix, AZ 85009
(602) 262-5401
(530) 865-4932 (24 hr. number)



THIS PRODUCT IS BASED ON COMMERCIAL FERTILIZERS AND GENERALLY HAS A LOW ORDER OF TOXICITY, AS INDICATED BY PRODUCT'S TOXICOLOGICAL ANALYSIS.

FIRE-TROL® FIRE RETARDANTS HAVE NO CAS NUMBERS.

CAUTION

Will cause eye irritation. Prolonged contact may be mildly irritating to skin.

A. MATERIAL IDENTIFICATION AND INFORMATION

1. GENERAL INFORMATION:

FIRE-TROL® LCG-R Liquid Concentrate is designed to be diluted with water and used as an aerial fire retardant for wildfires. The major ingredient is ammonium polyphosphate, a commonly used agricultural fertilizer. It also contains minor amounts of clay thickener, corrosion inhibitor, and colorant.

DOT Proper Shipping Name:	This product is not classified as a hazardous material by the U.S. Department of Transportation.
DOT Hazard Classification/I.D.:	Not Applicable
Label(s):	Product Label
U. S. Surface Freight Classification:	Fire Extinguisher Compounds, N.O.I.B.N.
SARA Hazard Notification, Hazardous Categories Under Criteria of SARA Title III Rules (40 CFR Part 370):	Immediate Delayed

2. SECTION 313 TOXIC CHEMICAL(S)

None.

3. CALIFORNIA PROPOSITION 65

California Warning: "This product may contain chemicals known to the State of California to cause cancer or birth defects, or other reproductive harm."

(Continued)

(Continued from Page 1)

4. **HAZARDOUS CHEMICAL(S) UNDER OSHA HAZARD COMMUNICATION STANDARD:**

Clay: "It is to be noted that IARC in Volume 42 (1987) of its Monograph on the Evaluation of the Carcinogenic Risk of Chemicals to Humans reports that there is limited evidence for the carcinogenicity of attapulgite to experimental animals and there is inadequate evidence for the carcinogenicity of attapulgite to humans (IARC Class 3). Fuller's Earth including attapulgite and montmorillonite, like many naturally-occurring minerals, may contain some free silica and crystalline silica, by itself, has been classified by IARC as a Class 2A carcinogen. IARC in Volume 42 (1987) reports there is sufficient evidence of the carcinogenicity of crystalline silica to experimental animals, and that there is limited evidence of the carcinogenicity of crystalline silica to humans."

HEALTH HAZARD CLASSIFICATION:

An immediate health hazard.
A delayed health hazard.

WARNING STATEMENTS:

WARNING!
Contains material which can cause allergic respiratory reaction. May cause respiratory tract irritation. May cause eyes and skin irritation.

PRECAUTIONARY MEASURES:

Use with adequate ventilation.
Avoid unnecessary contact with eyes and skin.

B. OCCUPATIONAL CONTROL PROCEDURES

1. FOR HANDLING CONCENTRATE PRODUCT:

a.	Eye Protection:	Wear safety goggles.
b.	Respirator Protection:	Not required.
c.	Skin Protection:	Rubber coated gloves and clothing which minimizes skin exposure are recommended.
d.	Ventilation:	Work in a well ventilated area.
e.	Ingestion:	Avoid ingestion.

2. FOR HANDLING DILUTED PRODUCT:

a.	Eye and Skin:	Avoid unnecessary contact with eyes and skin.
b.	Ingestion:	Avoid ingestion.

3. DO NOT DROP ONTO FIRE FIGHTERS.

C. FIRE PROTECTION INFORMATION

1. Product is non-flammable, has no flash point and no upper and lower explosive limits.

2. Special fire fighting procedures: Use water to keep fire exposed containers cool. Wear full protective clothing and self-contained breathing apparatus approved by NIOSH.

3. Unusual fire and explosion hazard: N/A

D. PHYSIOLOGICAL EFFECTS & HEALTH INFORMATION (TOXICOLOGICAL DATA)

1. FOR CONCENTRATE BEFORE DILUTION WITH WATER:

a.	Eye Irritation:	Can cause eye irritation and conjunctivitis.
b.	Skin Irritation:	Prolonged contact may be mildly irritating to skin.
c.	Ingestion:	May cause irritation of throat tissues.

Animal Test Results (Acute Exposure)

Rabbit Eye Irritation:	Minimally irritating.
Rabbit Skin Irritation:	Slight irritant.
Rat Acute Oral:	LD_{50} >5050 mg/kg (low toxicity).
Rabbit Acute Dermal:	LD_{50} >2020 mg/kg (low toxicity).

2. FOR MIXED READY-TO-USE LIQUID:

a.	Eye Irritation:	Can cause eye irritation.
b.	Skin irritation:	Prolonged contact may be mildly irritating to skin.
c.	Ingestion:	Can cause throat irritation.

Animal Test Results on Diluted Products (Acute Exposure)

Rabbit Eye Irritation:	Minimally irritating.
Rabbit Skin Irritating:	Slight irritant.
Rat Acute Oral:	LD_{50}>5050 mg/kg (low toxicity)
Rabbit Acute Dermal:	LD_{50}>2020 mg/kg (low toxicity)

Note: All animal results reported in this section for both concentrated and diluted products were run in accordance with the USDA Forest Service Specifications for Long-term Retardants; 5100-304a, February, 1986, through the U.S. Forest Service, by an independent laboratory. The results are all acceptable according to those requirements.

E. PHYSICAL & CHEMICAL PROPERTIES

1.	Specific Gravity:	12.0 to 12.3 lb./gallon for the concentrate.
2.	Viscosities:	1500 cps to 8000 cps.
3.	Appearance:	Thick red liquid.
4.	Solubility:	Mixes readily in water. Contains some insoluble material (clay, colored pigment).
5.	Vapor Pressure:	Less than 1 mm mercury at 100°F.
6.	Boiling Point:	223°F.

F. REACTIVITY DATA

1. FOR CONCENTRATE:

a. Concentrate is stable and hazardous polymerization will not occur.

b. Hazardous decomposition products: Ammonia and sodium cyanide. The latter is formed if the material is heated to over 815°F. Please note that these decompositions are not a cause for concern when the diluted product is used in fire fighting, due to air dilution and other factors.

c. Avoid contact with strong acids to avoid formation of hydrogen cyanide.

d. Avoid contact with zinc coated metals and magnesium due to excessive corrosion rates.

e. Acceptable containers and metals: 2024 T3 aluminum, 4130 mild steel and yellow brass have acceptably low corrosion rates.

(Continued)

(Continued from Page 3)

2. **FOR LIQUID AFTER DILUTION:**
   a. Avoid contact with zinc-coated metals and magnesium due to excessive corrosion rates.
   b. Acceptable containers and metals with respect to corrosion: 2024 T3 aluminum, 4130 mild steel and yellow brass.

G. ENVIRONMENTAL PROTECTION

1. **ENVIRONMENTAL IMPACT:**
Aquatic toxicity of FIRE-TROL® Liquid Concentrate Retardant - Rainbow Trout - LC_{50} value at 96 hours: 790 mg/liter.

Avoid lakes and streams in applying FIRE-TROL® LCG-R Liquid Concentrate Retardant, due to the sensitivity of aquatic life to chemicals. Fire retardant chemicals applied near streams have been shown to have virtually no impact on them. This is partly because there is a minimum of migration of chemicals from areas as close as three meters from the edge of a stream (Norris et al, "The Behavior & Impact of Chemical Fire Retardants in Forest Streams," Forestry Sciences Laboratory, USDA Forest Service Pacific Northwest Forest and Range Experiment Station, October 20, 1978).

Use and disposal employing proper environmental control practices should not cause significant environmental impact.

2. **PRECAUTIONS IF MATERIAL IS ACCIDENTALLY RELEASED OR SPILLED:**
Caution should be exercised in the area of spilled material since FIRE-TROL® LCG-R can cause a slippery condition.

3. **WASTE DISPOSAL METHODS:**
Contain spills and maximize recovery. Disposal of spilled material should be in accordance with applicable federal, state and local environmental regulatory requirements.

H. EMERGENCY & FIRST AID PROCEDURES

1.	Eye Contact:	Flush eyes with water immediately, if exposed.
2.	Skin Contact:	Wash skin thoroughly and change clothing.
3.	Inhalation:	Upon inhaling, move to fresh air.
4.	Ingestion:	Upon ingestion, have person who is conscious drink water and induce vomiting.
5.	General:	Seek medical attention as soon as possible if adverse effects occur.

NOTICE OF WARRANTY:
Fire-Trol Holdings, L.L.C. warrants that FIRE-TROL® products are reasonably fit for the purpose for which they were developed only when used in accordance with recommended use practices under normal conditions. In no case shall Fire-Trol Holdings, L.L.C. be liable for consequential, special, or indirect damages resulting from the use or handling of these products. ALL such risks shall be assumed by the buyer. FIRE-TROL HOLDINGS, L.L.C. MAKES NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR *PURPOSE NOR ANY OTHER EXPRESSED OR IMPLIED WARRANTY EXCEPT AS STATED ABOVE.*

Revised Date: December 30, 1999

Supersedes all previous dates for FIRE-TROL® Liquid Concentrates.